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CONGENITAL DISLOCATION OF THE HIP.[1]

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It is the function of the specialists to examine and report on questions lying beyond the limit of accepted facts. In this way specialization is justified, furnishing outposts to the larger force marshalling the whole profession of medicine and surgery.

The subject of congenital dislocation of the hip has for the last decade been under careful consideration, and, as the brilliant successes that have been recently gained were largely won by two honored members of our Orthopedic Association, it may be fitting in a representative of that association to present the subject in a triennial address before the General Congress.

It is not within the province of this paper to relate the history of the various attempts in the past to cure congenital dislocation of the hip, though this is an interesting chapter in the history of surgical progress of this century. Briefly, it may be said that the world is especially indebted to the efforts of Hoffa and Lorenz. Previous investigators accumulated facts which have served as a preparation for later successes.

In considering the subject an accurate knowledge of the pathological anatomy, fortunately now well understood, is of importance. The etiology of the affection, however, is not known, though it is clear that true congenital dislocation is an affection of the uterine life. It would seem also that it is not a defect of development, like hare-lip, but like congenital club-foot, a malposition of bones with the resulting structural changes

[1] Read before the Congress of American Physicans and Surgeons, Washington, D. C.

of the soft parts. It is a fact that the affection is much more common in girls than in boys, for some unknown reason.

The theory that the affection is due to intra-uterine pressure will appear to be substantiated by an infant specimen published by Mr.

FIG. 1.

Double congenital dislocation of the hip, showing lordosis.

Jackson Clark in the *Transactions of the British Orthopedic Society*, 1896, vol. i. page 36, where in uterine life the thighs were apparently flexed for so long a period without extension, as to cause the firm contraction of the anterior portion of the capsule. Later extension of the limb, possible from an increase of amniotic fluid or from any cause, would, in a shallow acetabulum, cause dislocation of the hip.

PATHOLOGICAL ANATOMY. *Changes in the Capsule.* The most important of the anatomical changes to be observed are the changes in the capsule. The capsule is not ruptured, as in a traumatic dislocation, but is gradually stretched. The upward ascent of the head is increased as the child's weight increases, and the capsule is dragged with it. It becomes even at an early age much thickened, especially in its anterior surface, and the shape of the capsular cavity is changed from that of an irregular globe passing from the rim of the acetabulum to the attachment around the neck of the femur. The capsule may be described as in shape like an empty purse-bag glued to the bone, the lower portion covering the acetabulum, the free portion enclosing the femoral head, and the purse-neck, the part where the head of the femur left the acetabulum stretching the adherent capsule with it.

FIG. 2.

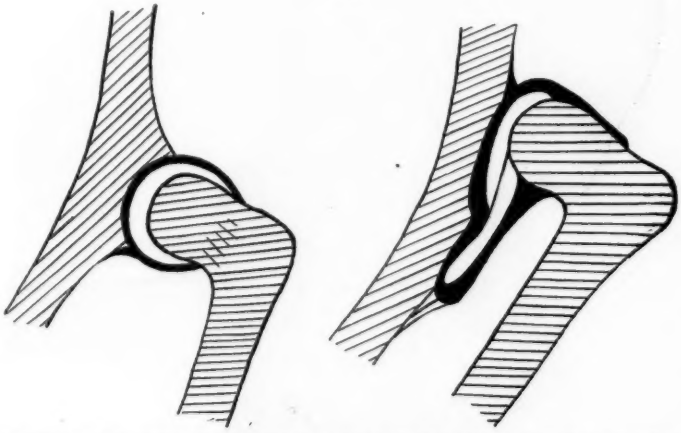


Diagram showing section of the capsule in a normal hip-joint and in congenital dislocation.

What may be termed the neck of the capsule is attached on its iliac surface to the ilium, and this attachment may be unusually firm, that covering the acetabulum becomes altered, and with the changes of the synovial membrane and stretched cotyloid ligament resembles firm fibrous tissue filling as well as covering the socket, so that the cavity may be obliterated.

Alterations in the Muscles. Much discussion has taken place in regard to this important matter. The arguments and observations of Lorenz, however, may be in the main accepted. It is not true, as has been previously claimed, that all the muscles that pass from the pelvis to the trochanter are shortened and constitute an obstacle to reduction. The

glutæi are somewhat altered in their size and structure from alteration of their function owing to the difference in direction in which they move, but are not contracted, and the group of muscles which surround the acetabulum and pass around the neck of the femur to the great trochanter, *i. e.*, the pelvic trochanteric muscles, are lengthened. The pelvi-femoral muscles, *i. e.*, those inserted along the shaft of a femur, are, however, shortened, especially the adductors. This is also true of the pelvi-crural muscles.

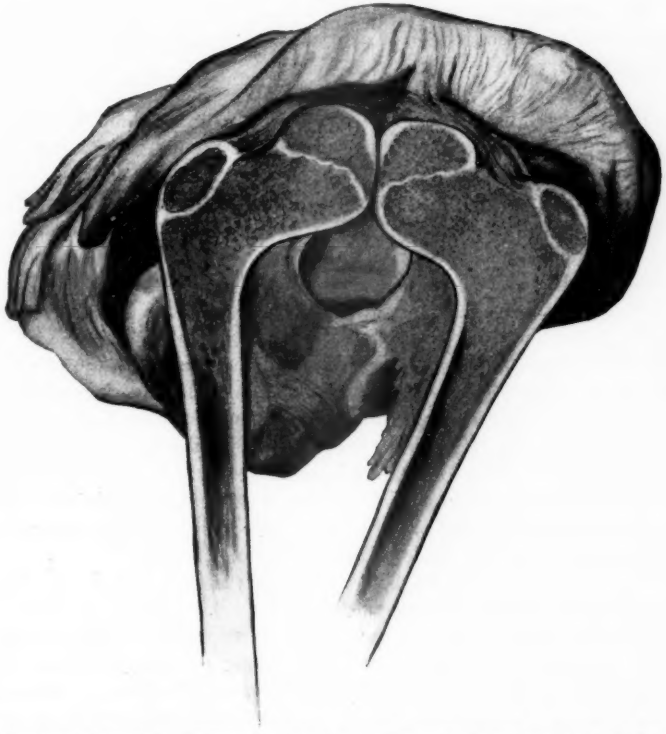
FIG. 3.

Congenital dislocation (Warren Museum). Femur sawn. The acetabulum not seen. The thickened capsule shown.

Alterations in the Bones. It is due to Hoffa that it is now clear that the altered soft parts and not an absence of the acetabulum present the chief difficulty in reducing a congenital dislocation. The acetabulum, however, is altered in its shape, becoming triangular, instead of oval, and may be broadened and flattened. The cartilage which normally covers the socket disappears except at the rim, and is replaced by fibrous tissue.

The formation of a new false joint with osseous socket is not seen in congenital dislocation in children; it is extremely rare in adults, though a depression in the surface of the ilium at the point where the head of the femur rests is to be seen. The neck of the femur is frequently altered in two directions; the normal obliquity is lost, the neck being at right angles with the shaft. A twist in the neck is also seen. The shape of the head is frequently altered, the round shape is changed into a pointed one, and in some instances the head is much smaller than normal.

FIG. 4.



Specimen of congenital dislocation of the hip. Femur sawn through the head and shaft and turned back, showing the opened capsule. The dark space is the acetabulum nearly covered by the capsule.

There are three varieties of congenital dislocation, classified according to the position of the head. They may be classed as backward, upward, and forward. In the backward the head lies upon the dorsum of the ilium, resembling the position of the usual traumatic dislocation.

In the upward dislocation the head rests above the acetabulum, and in the forward the head lies nearly beneath the anterior spine. In the latter case the foot is drawn somewhat outward; in the former it is necessarily turned in, or this would be the position if it were not for alterations in the shape of the neck.

NOTE.—The anatomical changes in congenital dislocation are well illustrated by four specimens in the Warren Museum, carefully examined by Dr. E. H. Nichols, Instructor in Surgical Pathology in the Harvard Medical School.

The alterations in the capsule here mentioned are demonstrated in two of the specimens in alcohol, and the twist in the neck of the femora in the two dry specimens.

DIAGNOSIS. The diagnosis of this affection is not difficult in adult cases or in large children, as the characteristic peculiarities in gait and attitude are easily seen.

The following affections may be confounded with it in smaller children: coxa-vara, distortion following infantile paralysis, separation of the epiphysis, deformity following early arthritis of infancy, and traumatic dislocations, and the deformities of hip-disease.

In all of these affections, with the exception of the first, viz., coxa-vara, there should be a history of previous injury or illness; and in all, with the exception of coxa-vara and infantile paralysis, the freedom of motion of the femur seen in early congenital dislocation is not found.

Coxa-vara, or the rhachitic distortion of the neck of the femur, which shortens the limb and raises the trochanter above the Nélaton line, may be confounded with congenital dislocation.

The mistake can be avoided if the fact is borne in mind that in coxa-vara the head is in its normal socket, while in congenital dislocation the head is to be felt outside of the acetabulum.

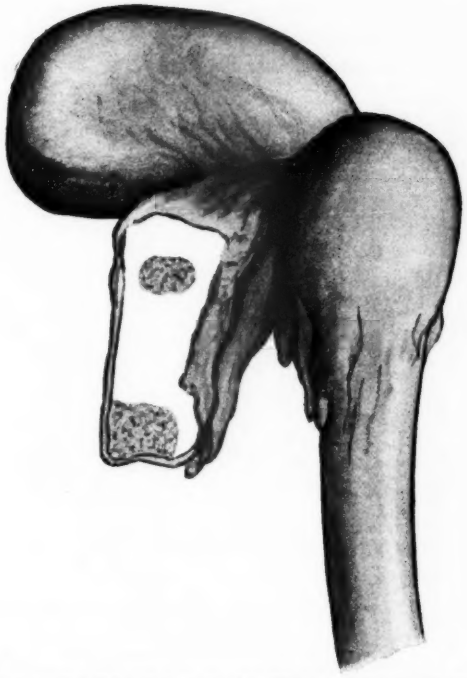
Coxa-vara is rarely seen before five years of age, and is only very exceptionally noticed as early as three.

In small children with fat buttocks it is sometimes difficult to find with certainty the dislocated head. As Delanglade has pointed out, the diagnosis is aided by remembering that where the head of the femur is in the acetabulum, rotation takes place with the acetabulum as the centre, and the neck as the radius of the arc of motion; where the head is out of the acetabulum, and the trochanter is the centre of motion, the looser head describes the arc.

The affection of congenital dislocation is occasionally regarded as a disease of the spine, as marked lordosis is always present, and in many instances spinal corsets have been applied with the idea that this is the chief source of the trouble. The affection, singularly enough, causes

but little anxiety in the minds of the parents, who either do not notice the difficulty or who look upon the peculiarity in gait as due to an infantile habit. The peculiar side-to-side gait of double congenital dislocation is pathognomonic. When the affection is unilateral the gait is also characteristic, and has been aptly compared by Saint-Germain to

FIG. 5.



Specimen of congenital dislocation of the hip (Warren Museum). Section through the acetabulum showing the covering of the acetabulum by the reflected capsule and the shallowness of the acetabulum.

the gait on the free side of an organ-grinder carrying a barrel-organ. The gait is due to the patient's attempt to diminish the strain upon the ligaments sustaining the weight and to supplement the glutæi, whose function is impaired.

Fluorescopic examination, when available, is of great value in diagnosis.

PROGNOSIS. The disability caused by this affection in childhood is slight. The limp is noticeable, and, in double congenital dislocation, may be distressing. As the patient becomes older and the weight

increases, some annoyance may be caused in adolescence; but the disability is ordinarily not great until middle life or old age. In single dislocation the disability in adults may be only an inability to engage in active occupation, accompanied by occasional attacks of severe muscular pain, with muscular cramps. These attacks subside under rest, but, if the patient becomes heavier or feeble, may necessitate the use of crutches and severe disability. Where the dislocation is on the dorsum the disability is greater than where it is anterior or above the acetabulum. Muscular patients suffer less than those with feeble muscles. In double dislocation the disability is increased.

FIG. 6.

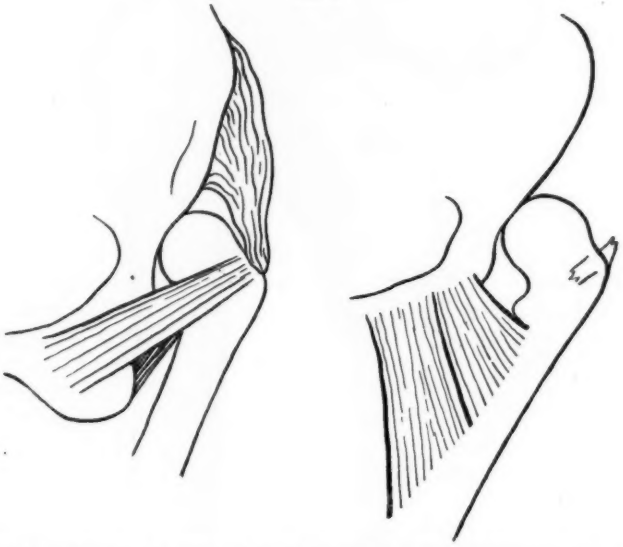


Diagram showing the position of the pelvi-trochanteric and pelvi-femoral muscles in congenital dislocation of the hip.

The pelvis, though altered in shape, does not appear to be changed in such a way as to interfere with childbirth.

TREATMENT. In congenital dislocation the weight of the trunk does not fall normally upon the lower extremities; the body may be regarded as slung to the femora by the capsule, aided by certain muscles, in the same way that the carriage of the last century was slung to the truck by straps. No cure of congenital dislocation is complete until the dislocation is reduced and it is certain that the weight of the trunk is supported on the head of the femur resting in the acetabulum.

As the tissues present obstacles in the shape of thickened capsule, shortened and misplaced muscles, an altered acetabulum and a misshapen femoral head, the procedure of reduction needs force or incision

FIG. 7.

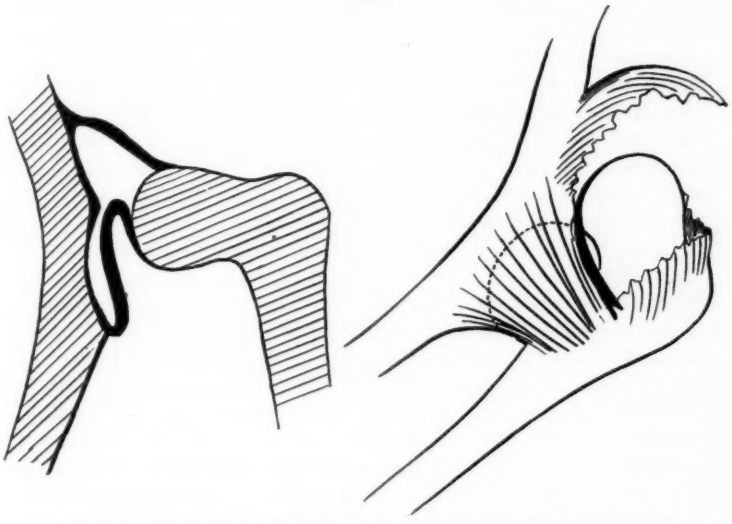


Diagram illustrating difficulties in reduction of con genital dislocation of the hip: first, in the capsule covering the acetabulum; second, in the shortened capsule between the acetabulum rim and lesser trochanter.

to stretch or divide contraction, means to deepen its socket, besides skill in manipulation for reduction. The methods can be grouped as

Reduction after incision.

Reduction by forceful manipulation.

Gradual reduction by mechanical appliances.

Operative measures apart from excision were first performed by Poggi and Margary; but it is to the credit of Hoffa that a successful method has been presented to the profession. Lorenz has improved the details both of reduction after incision and of forceful manipulation.

The patient is to be placed upon the back with the limb abducted and rotated outward. The incision is made in a line drawn from in front of the anterior superior spine, obliquely downward and forward, crossing the femur a short distance below the top of the trochanter. The incision should be along the outer edge of the tensor vaginæ femoris, between this and the anterior border of the glutæus medius. The incision should pass well below the femur, and should cross it slightly above the level of the trochanter minor. The tensor vaginæ

femoris is retracted, and the fascia lata divided by a straight incision, and, if necessary, by an additional cross incision. The glutæus is also retracted, and beneath the tensor muscle the rectus femoris will be found, with a reflected tendon passing outward, to be inserted upon the ilium above the acetabulum. If the muscular tissues are well retracted the capsular ligament will be uncovered and can be split. This should be done by an incision in the direction of the orginal skin incision, and should be free enough to expose the whole head and neck as far as the trochanteric line. An assistant should flex the thigh to a right angle to the trunk, and the attachments of the capsule to the neck and trochanteric line, including the lesser trochanter, should be freed both on the anterior and posterior surface of the neck to such an extent that the surgeon can pass his finger completely around the neck. The head can then be thrown out and the ligamentum teres divided, if present. The head of the femur can then be pulled aside and a clear view of the capsule covering the acetabulum, as well as the acetabulum, can be had. A curette can then be introduced to deepen the acetabulum, if necessary. It is important that the bony edge overhanging the acetabulum should project sufficiently to furnish a firm socket after the head is reduced. It is sometimes difficult, if the tissues are imperfectly divided, to find the socket, for the reason that a portion of the capsule lies flat across the socket, and is adherent to the edges, the surgeon feeling only the upper edge and a mass of connective tissue. This connective tissue must be divided in order to open the cavity.

It is sometimes necessary, if the head of the femur is conical in shape, to remove a portion, but if the cartilage on the acetabulum is removed and the head of the femur freed from its cartilage, anchylosis is liable to result. It is particularly necessary that the capsule should not be folded in attempted reduction in such a way as to prevent the free entrance of the head into the acetabulum, and it is especially important that the connection between the acetabulum and the femur at the trochanteric line and lesser trochanter should not be so firm as to prevent the reduction of the head into the socket. Where it is found that the head when reduced into the socket will not remain there if the leg is adducted or extended, some remaining fibres of the capsular attachments on the anterior surface, passing from the ilium to the lesser trochanter and its adjacent parts, will be found to exist. After the acetabulum has been deepened sufficiently, the reduction of dislocation should be performed.

Certain obstacles to reduction may be met, as follows: a thickened capsular fold above the apex of the acetabulum; narrowness of the constriction about the neck; undivided contraction of the capsule on the anterior and inner surface; contraction of the adductor muscles; a narrowness of the acetabulum. The manipulation necessary for the

reduction differs from that usual in reduction of dislocation of the hip in that if the tissues are sufficiently stretched or divided, the head will be placed readily into the newly formed acetabulum. Where the head can be placed into the acetabulum with the leg somewhat adducted, the femur can be used as a lever to stretch such portions of the capsule as have been undivided by the knife. After the reduction the redundant capsule can be stitched, with free drainage, or packed, according to the judgment of the surgeon as to need of complete drainage, or to trust to healing and absorption. Drainage is of especial importance, as the cavity is a deep one and may be shut off in the process of repair by muscular contraction. Furthermore, in this region the danger of infection from urine, in some small children, is great. The cases of death by sepsis are apparently due to omission of this precaution. The limb should be flexed by means of a plaster-of-Paris spica reaching from the thorax down to the foot, holding the limb in a flexed and strongly abducted position, and a window cut through the bandage to the covered wound. The amount of abduction is dependent upon the amount of difficulty in retaining the head of the femur in the new acetabulum. The position of the limb can be gradually brought to normal by later application of plaster-of-Paris bandages.

Ultimate Results. Although the results of the earlier operations are not as favorable as those where added experience has taught the dangers and errors to be avoided, it is now thoroughly established that these cases can be cured by reposition through incision. This is not only shown by the cases of Hoffa and Lorenz, but by the specimen from the patient operated upon by Delanglade. A child of three years with double congenital dislocation, six months after a successful operation upon one hip, died from measles before the second hip was operated upon. A complete cure was found to have been gained, the hip being placed in a well-formed socket. Hoffa reports 82 cases of reduction by incision, 30 of these being double, 52 single; 7 deaths; one during operation (chloroform?), one from intestinal catarrh, one from pneumonia, one from diphtheria, and the others from narcosis or shock. Of those who lived there was a useful joint, with from one to three centimetres shortening in most cases, with good motion, though not full motion in all instances. There were 9 anchylosed cases, and 8 cases in which there was sepsis. Lorenz divides his cases into three series, the first, 12 cases in which there was suppuration and pus in five; and a series of 100 later cases where there were excellent results, with pus, followed by anchylosis in only one instance. In 2 there was a slight fibrous adhesion. Delanglade reports 40 cases of reduction by incision, and 5 deaths from sepsis, with excellent results as far as could be determined in all, with the exception of two relapses. The mortality from sepsis would appear to be higher than thorough surgery would justify. It should be

borne in mind that considerable difficulties are met in operating in this region, especially in children, where the danger of soiling the dressings with urine is great. It is for this reason that Hoffa advises that the wound should never be sewn, but should be packed, and antiseptic rather than aseptic precautions be used. Where the wound was not sewn he had no trouble from sepsis. It is to be remembered that the wound is a deep one, and thorough drainage is not furnished by all incisions. It can, however, be expected that where drainage and antiseptic precautions are used the danger from sepsis will disappear.

Schanz (*Zeitschrift f. orthopädische Chirurgie*, Bd. iv. Heft 2, p. 207) has collected 135 cases operated upon by twenty-one different operators. Death occurred in 7 cases. In 4 death followed from complication. In 8 the result was unsatisfactory. In 6 the result was but partially satisfactory. In 109 the result was excellent.

Forcible Reposition. The first case I have been able to find of an attempt at forcible reposition under an anæsthetic in congenital dislocation of the hip is that performed by Dr. Post in 1884, and published in the report of the Boston City Hospital,[1] where the manipulations recommended by Bigelow for traumatic dislocation were done forcibly, and the dislocation was apparently reduced. A relapse, however, subsequently occurred. In 1888 the forcible reposition was recommended by Paci, and the method has been extensively discussed by Continental surgeons. The method, however, lacked precision until Lorenz, whose experience in reduction by the aid of incision had given him a thorough knowledge of the pathology of the congenitally dislocated joint, suggested the so-called bloodless method. The method has now been employed by Lorenz, Hoffa, and others with undoubted and permanent success, and with much less risk than that following reduction by incision. The operation has proved successful in children younger than five, and in some cases in children as old as seven. The method recommended by Lorenz may be described as follows:

Before the operation, traction to stretch the muscles should be employed, combined with gradually increasing abduction. After a short time of this preliminary treatment the patient should be anæsthetized and extreme force applied to the limb, with the thigh abducted. The child is placed upon its back and traction is exerted by means of a loop of yarn placed around the ankle and attached to a screw-force fastened to the end of the table. Counter-traction is exerted by means of a long sheet of folded cloth placed beneath the perineum on the unaffected side. Force is slowly applied. The pelvis is tilted, and abduction is thus developed. This stretches not only the adductor muscles and the flexors, but also the hamstring and rectus femoris muscles, and the

[1] Report of the Boston City Hospital, 4th series.

capsule which is firmly attached to the ilium, the shortened condition of which holds the femur in place. The ankle can be protected by saddlers' felt. If sufficient force is gradually applied, not only the capsular attachments stretch, but, the head of the femur being pulled upon, the capsular neck is stretched. This can be still further enlarged if the stretched leg is forcibly moved from side to side in such a way that the head and neck may force their way through the acetabular pocket. After this procedure has been carried on for several minutes, accompanied by forcible manual stretching in the shape of massage of the adductor group, and aided possibly by a tenotomy of the adductors, forced circumduction of the thigh should be carried out. The different manœuvres for reduction of the hip should then be executed, flexion, abduction, and in-and-out rotation, varied in different cases according to the obliquity or twist of the neck and situation of the head. The exact manœuvre which may be necessary can be determined if the hand of the operator is placed upon the head and its approach to the acetabulum determined. The reduction takes place with a noticeable jerk, as the head of the femur passes into the acetabulum, similar to what is seen in ordinary dislocation, but less marked. It will frequently be found that, after the reduction has taken place, dislocation will recur if the limb (previously strongly abducted and slightly flexed) is extended and adducted. This indicates that the anterior and inner attachments of the muscles and capsule are not sufficiently stretched, and would justify further attempts at stretching. As Lorenz has suggested, if the head is placed under the upper acetabular lip, the femur can be used as a lever to stretch the contracted tissues. After the reduction is thoroughly assured, the limb should be placed in a plaster-of-Paris spica, in a strongly flexed and abducted position, or, in other words, in such a position that the glutei muscles and the pelvi-trochanteric muscles can have a mechanical advantage over the flexor and adductor group. The amount of time the patient shall remain in this position will depend upon the amount of difficulty encountered in the reduction. Lorenz is undoubtedly correct, that if the patient is secured in such a way that flexion and adduction are not possible, the sooner locomotion is attempted, the better. In unilateral dislocation the patient should be allowed to walk, fixed by a plaster spica with the limb in an abducted position, within a few days, or as soon as the patient can stand. Where great resistance is encountered in the reduction, this may require a series of plaster bandages, some applied under an anæsthetic. After a while the fixed appliances may be removed and a split spica can be employed, allowing massage of the muscle. If the unaffected limb is raised the patient is obliged to walk with the affected limb abducted, which serves as a protection against recurrence. This also gives increased pressure inward and upward on the acetabulum. Treatment by manipulation

and massage should be continued for several months, and the protective appliances gradually removed.

NOTE.—I am greatly indebted to my colleague, Dr. Dane, for directions in regard to the method of bloodless reduction.

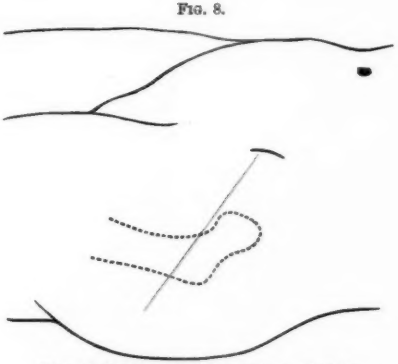
He employed this method successfully in a case, a girl of seven, in my service, after having visited Professor Hoffa and having witnessed several of his operations courteously shown him.

Minor modifications in the method may be found of use. As the important structure to over-resistance to complete reduction is the anterior and inner portion of the capsule, or, in other words, that portion of the tissues which prevents forcible abduction, it is manifest that the direction in which the limb should be stretched is in the direction of abduction. If a child is placed upon its back on a frame, and by means of weight and pulley a slight traction is exerted with the legs abducted, it will be found that the amount of abduction can be gradually increased. A counter-pull can be made by means of cross-straps pressing down upon the top of the trochanter, as is indicated in the accompanying illustration. This can be done without causing the patient great discomfort, and a position of forced abduction nearly at right angles with the trunk of the limb can be gained in young children after a short time. Later, under an anæsthetic, a stretching appliance should be applied in such a manner as to stretch in an abducted position. A most efficient apparatus for this purpose is furnished by adding a windlass-traction attachment to the well-known Thomas knee-splint. At the upper end the attached ring presses upon the tuberosity of the ischium and the ramus of the pubes; at the lower portion a windlass with a long-handled crank is attached. This is connected with straps fastened to adhesive plaster applied along and across the leg and thigh, and firmly bandaged to the limb. All desired power can be exerted and the limb can be moved forcibly in the direction of adduction. The patient should be placed on the back and the buttocks raised slightly by a pad. The traction appliance should be applied and traction slowly used, with the limb in as abducted a position as is possible. Under the traction, and with the help of the apparatus, abductions should be forcibly employed. This should be done until the axis of the limb is at a right angle with that of the trunk. After this the limb should be stretched in the direction of hyperextension under strong traction.

Greater precision is furnished by the mechanical arrangement for stretching here mentioned, but it is not always obtainable, and in its place manual force can be efficiently used in young children, aided by a strap or the hand applied so as to pull the greater trochanter downward and inward, while the thigh is forcibly abducted. It should

be remembered, however, that the manipulations needed in traumatic dislocation are not effective in congenital dislocation, the anatomical condition being different.

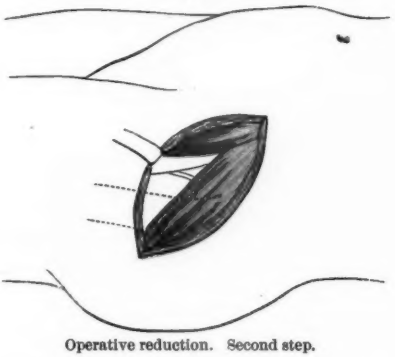
FIG. 8.



Line of skin incision for operative reduction.

In reducing congenital dislocation the limb should first be hyperabducted and hyperextended, as well as forcibly rotated, making room for the descent of the head by stretching the contracted capsule. If the stretching of the capsule can be thoroughly performed, a reduction can be effected; if not, an incision is necessary. The procedure varies

FIG. 9.

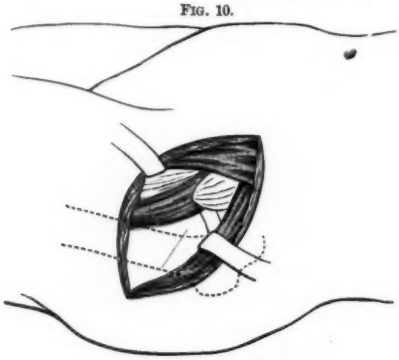


Operative reduction. Second step.

according to the amount of twist in the neck of the femur, as well as according to other anatomical conditions, but it may be described as forced hyperabduction, forced hyperextension, forced circumduction, followed by twisting the head into the acetabulum, the limb being somewhat flexed, abducted, and rotated outward.

NEOARTHROSIS OPERATION. Where it is impossible to reduce the dislocation, and in the older cases the alteration in the capsule and the adhesions are so great that this is found practically out of the question, an operation has been proposed by Hoffa for the establishment of a new

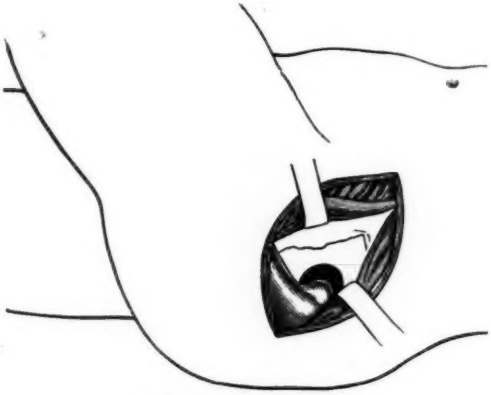
FIG. 10.



Operative reduction. Third step.

joint, based on the fact that in congenital dislocation there is no new formation of bone around the capsule, and that no true new joint is established. Hoffa claims that it is impossible that the pressure of the

FIG. 11.

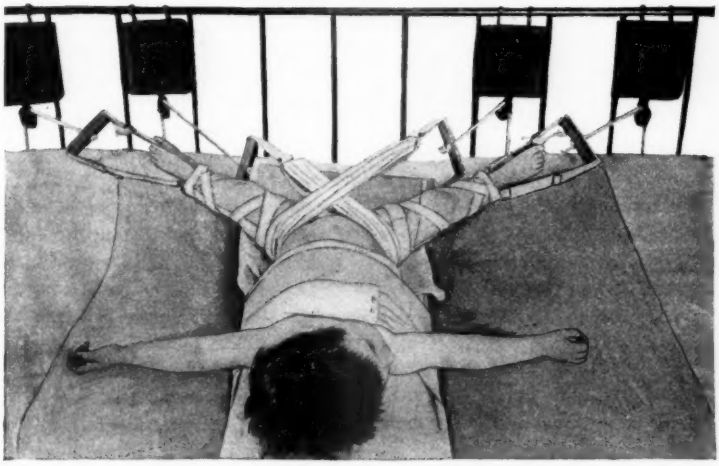


Operative reduction. Fourth step.

head should furnish sufficient irritation on the ilium for the establishment of a new and firm bony socket, as it is separated from the bone by a thick capsule. He therefore recommends in these

cases the opening of the capsule, and by means of the curette irritating the bone, after reducing the deformity as far as possible by

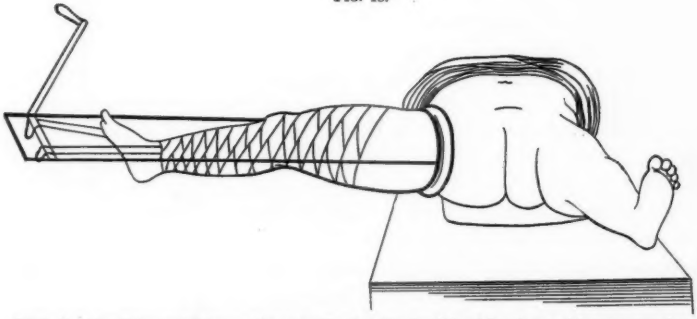
FIG. 12.



Method of traction preliminary to operation in double congenital dislocation.

means of traction, and using the contracted and shortened capsule in such a way as to prevent a free excursion of the bone upward when weight is thrown upon the limb. Although a few cases have been

FIG. 13.



Method of forcible stretching under anæsthesia with forcible abduction and hyperextension.

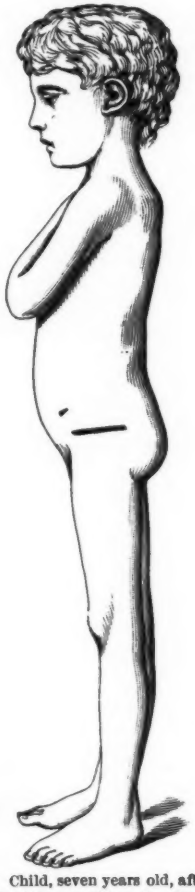
reported, the value of this method has not yet been thoroughly demonstrated. The unsuccessful cases of so-called Hoffa operation, where reduction after incision has not been effected, have been practically

cases of neoarthrosis, and it can be said that anything which will thicken and strengthen the capsule will be an advantage. It is also an advan-

FIG. 14.

Child, four years old, showing profile of back after operative reposition (anterior incision) in single congenital dislocation of the hip.

FIG. 15.



Child, seven years old, after forcible reposition in single congenital dislocation of the hip, showing absence of lordosis.

tage to change the dislocation from a posterior to an upward dislocation, but the procedure must stand the test of time before adoption. It can, however, be hoped that with the perfection of detail in surgical technique, older cases may be more successfully operated upon than is at present true.

Excision of the head does not seem a proper procedure in congenital dislocation.

Generalizations as to the permanent value and limits of usefulness in operative reduction can, perhaps, not be made definitely before the next decade. It is certain, however, that in young subjects a reduction can be made, and, although the immediate improvement in gait is not always at first as great as could be desired, the amount of improvement gained, as well as the certainty that a femur acting in its normal posi-

tion will develop more normally than if dislocated, justifies the belief that the improvement in gait will be much greater in adult life than immediately after reduction. The gait of middle-aged or even adult patients operated upon when young has yet to be determined, but it is probable that it will be normal. Reduction by means of incision is at present an operation to be performed in all cases between seven and fifteen. The shock and mortality, as well as the relapses and stiffness observed in some cases, are due largely to imperfections in details always incident to the introduction of a new method. They are, however, remediable, and will disappear as the operation is done more rapidly and antiseptic details are more thoroughly carried out. Excellence in the result will depend upon the amount of deformity remaining in the neck of the femur. This in younger cases will be less than in older, but even in older cases a subsequent osteotomy of the neck of the femur, such as is used in coxa-vara, may be expected to give an increased improvement in gait.

Mechanical Treatment. It would seem as if the gradual reduction of a congenital dislocation of the hip into a loosely formed socket should be an easy one. Experience, however, belies such an opinion. One difficulty, apart from overcoming the muscular contraction, lies in the fact that a traction force which is exerted without an anæsthetic pulls the head past the opening into the acetabular pocket without sufficiently stretching the capsular attachment to the ileum, and leaves an interposing thick capsular covering which prevents the entrance of the head into the socket. It has been supposed that manipulation would force the head of the femur into the forming of a new acetabulum, but that opinion is based upon a false supposition of the pathological conditions. It is irrational to suppose that the head of the femur would force its way through a structure almost as firm as the tendo Achillis. There may be instances where the capsular neck is wide, and the head would easily drop into the proper position, but clinical experience does not support such a belief. Positive and enduring success under mechanical treatment has yet to be demonstrated by clinical evidence.

But even if it is doubtful if any case has been completely reduced under gradual stretching, it is possible that in the future this may be done by means of a traction force in the position of forced abduction which will thoroughly stretch the flexor and adductor muscles and the capsule, and later twisting the head through a widened capsular neck into the acetabulum. Any weakening of the joint could be overcome in time under graded and protected use of the limb. An attempt of the sort would be justifiable only in very young children, but at present no surgeon would be warranted in attempting it for a period longer than a few weeks.

Palliative Measures. As palliative measures are recommended in the shape of traction appliances and corsets, where for any reason

operative treatment is impossible and improvement all that can be aimed at, the question of the most rational means of improvement is the proper one, with the value of which a surgeon should be familiar. It is clear that any method which will shorten the lengthened capsule and lengthen the shortened muscles will be of advantage, but it is also clear that this will not be sufficient and effect a cure. The amount of benefit which can be expected is not great, but in the patients who have worn apparatus of this sort noticeable improvement in gait can be observed.

To express it figuratively, the body of the carriage slung on a truck would be hung higher if the straps which sustain the weight were shortened. A Thomas knee-splint furnished with traction meets the indications of a downward pull, and its use in young children will be found to lengthen the limb and interfere with the child's freedom in play and locomotion but slightly; lengthening of the limb can be obtained and maintained, and it is probable that in time the soft tissues will be altered. Corsets improve the patient's carriage and check the tendency to lordosis while they are worn; if accompanied by proper gymnastic exercises it cannot be thought that they interfere materially with the muscular development, provided massage is employed. A simple corset to be applied can be made as follows: A cast is taken of the patient's trunk and hips under moderate extension. This can be taken in the recumbent or in the suspended position. The corset should be made from this cast, passing well down upon the hips. The corset can be made of cloth, leather, or stiffened paper, or a combination of these. The leather or cloth should be reinforced by steels. The object of such a corset is to exert a forward pressure on the back between the shoulders and on the lower portion of the sacrum, and a backward pressure over the abdomen. Such a corset can be made to furnish a downward pressure upon the trochanter. This can be aided by the use of perineal straps.

NOTE.—My personal experience in the treatment of congenital dislocation of the hip can be divided into three classes:

Class 1; the mechanical treatment; eight cases. In one the treatment was continued thoroughly according to the Guerin and Buckminster Brown method, with three years of recumbent traction, followed by a corset and apparatus. In none of these cases can the results be considered as satisfactory, and the treatment may be regarded as palliative. Several of the cases have been watched for eight years; and in one, the gait after treatment by massage and gymnastics is excellent, though considerable lordosis remains. One case, a girl of sixteen years, had undergone thorough treatment when a young child by recumbent traction and manipulation for several years with a supposed cure; a relapse after puberty had taken place at the time the patient presented herself to me.

Class 2; operations by the Hoffa method with the Langenbeck incision; six cases, two being double. Recovery from the operation in four. The ultimate results in these cases, however, were not satisfactory. One died five weeks after the operation, during an epidemic of naso-pharyngeal diphtheria, suppuration occurring in the wound before death. Death followed in another case in six weeks after recovery from the operation, with the wound healed, from scarlet fever; in a third case, a month after the wound healed, from an unknown cause, with dysenteric symptoms. In the three remaining cases, one being double, but little improvement followed in gait (although complete recovery from the operation took place), and the head was in all probability not thoroughly reduced into the acetabulum, as it did not seem firmly fixed, and some lordosis remained.

Class 3; five later cases. Operation performed by Lorenz's anterior incision. The head was reduced in four of these, one being at present under observation; in the fifth case, a girl of fifteen years, the head was not reduced, suppuration followed, the girl recovered with a useful but not improved limb.

Class 4; reduction by forcible manipulation; four cases. Two cases in which twelve years ago an imperfect attempt at forcible reduction by the Post method was made unsuccessfully; two later cases, one double, treated successfully. In one, of the age of seven, single dislocation, the reduction was performed by Dr. Dane employing the Lorenz method. In the second, a child of three years, with double dislocation, reduction was effected by means of forcible splint-traction.

Class 5; three adults (single dislocation) treated for attacks of severe muscular pain, treatment by means of rest, local application of heat, massage, electricity, and the temporary use of crutches. The patients recovered from the attacks after a period of discomfort varying from two weeks to six months.

Conclusions. Congenital dislocation of the hip is a dislocation of the head of the femur upward, occurring in uterine life.

A shallow triangular acetabulum results.

A diminution of the angle between the neck and the shaft takes place and there is a twist of the neck.

The capsule is altered by being stretched, thickened, first dilated in its upper portion, stretched across the acetabulum in the lower portion, and constricted at the rim of the acetabulum.

The most important obstacle to reduction lies in the attachment of the capsule displaced and thickened to the ilium above and around the front of the acetabulum, and to the anterior surface of the femur, especially to the lesser trochanter.

The shortened pelvi-femoral muscles also offer a resistance to reduc-

tion, and with the contracted capsule will prevent reduction or cause relapse.

Obstacles to the reduction of deformity also lie in the shape of the head and in the shallowness of the acetabulum.

Traction in a straight direction cannot effect a cure.

Traction in strong abduction with downward pressure upon the head may bring about reduction.

In children over two and under five years—in some instances between five and seven years—under an anæsthetic, forcible reduction can be successfully used. This can only be accomplished if the head of the femur is forced into and through the capsular neck dilating it, into the acetabulum, and only after the capsular attachments adducting and flexing the limb are thoroughly stretched.

Successful reduction is always accompanied by an audible movement of the head of the femur into the capsule; bandages and fixation apparatus are to be used to prevent relapse, until the contracted tissues are sufficiently long and the pelvi-trochanteric muscles have regained their power to a sufficient extent that a recurrence of the dislocation is impossible.

In cases older than seven and under fifteen years, and in some cases between five and seven years, an open incision is necessary for reduction of the dislocation.

The line of incision following the outer edge of the tensor vaginæ femoris is the preferable incision.

Inability to reduce the head is due to capsular attachments from the acetabulum and ilium to the femur, which have not yet been divided or stretched.

In old adolescents, or adults, the operation where extensive alterations in the bones takes place, operative reduction has not been successful.

The use of corsets and traction splints may improve the attitude, but cannot cure.

NOTE.—In the earlier literature of congenital dislocation, the writings of Pravaz, Guerin, Carnochan, and Buckminster Brown are of interest. In contemporary literature, the following articles will be found of value:

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THE CUTANEOUS TUBERCULOSES IN CHILDHOOD.[1]

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The tuberculoses form part of the great class of granulomata, and, as the latter will recur constantly, it may be well to state that I understand by the term, infectious neoplasms. Childhood, for the purposes of this paper, ends with the fifteenth year.

For convenience, the subject may be divided into two classes:

I. Tuberculoses.

II. Paratuberculoses.

In the first the tubercle bacillus occurs in the tissues, in greater or less number; in the second no such finding has so far been made except in instances so rare that, for practical purposes, they are negligible, although occurring in persons who suffer from other manifestations of the disease.

I. Tuberculoses.

Four groups are usually described in this class, but a fifth must now be added. In order of frequency and importance they are:

1. Lupus vulgaris.
2. Scrofuloderma.
3. Tuberculosis verrucosa.
4. Tuberculosis vera.
5. Miliary tuberculosis.

Their symptomatology must be separately considered,[2] but etiology, pathology, prognosis, diagnosis, and treatment may, with a little ingenuity, be so arranged as to include the four varieties to be considered.

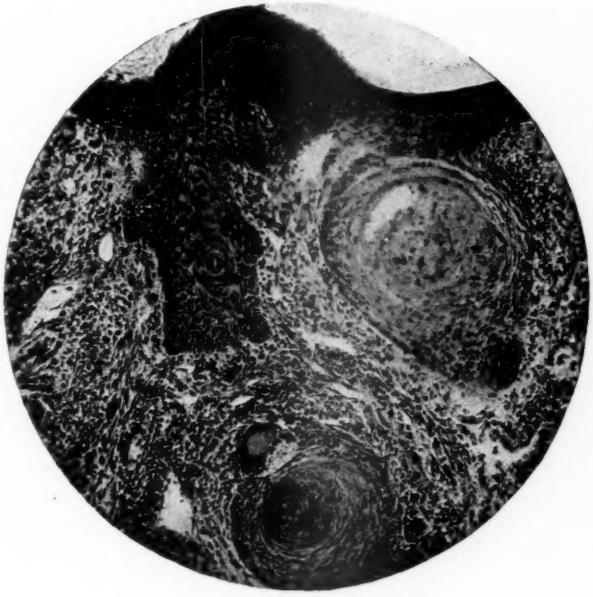
Symptomatology. *Lupus vulgaris*, in a great majority of cases, begins in childhood. The site of predilection is the face, but the disease may be disseminated over the whole integument. The primary lesion is a soft, semi-translucent nodule, deeply situated in the derma,

[1] Read before the Pediatric Section of the American Medical Association.

[2] The scheme of treatment of this division of the subject is a modification of that used by Dr. Bowen in Morrow's "System of Dermatology."

showing through the epidermis the characteristic tint described by Hutchinson as that of apple-jelly. They may occur singly or in groups, the latter coalescing, and projecting later above the surrounding skin level. The plaque is soft, elastic and after a time begins to show a slight scaliness. Its growth is very slow, months, years even being required to form a patch one to two inches in diameter, and, as in many other instances, it is characterized by periods of quiescence and activity. Extension takes place peripherally by growth of the plaque

FIG. 1.



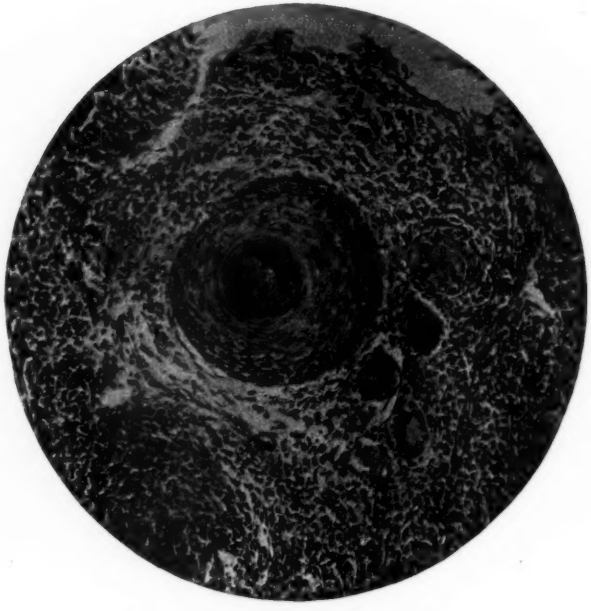
Lupus vulgaris, showing giant cells.

itself or the addition of new nodules. Ulceration is often a part of the process, taking place almost invariably when the disease attacks the various orifices, nose, and mouth. This necrosis may involve all the underlying structures except bone, which is never attacked, and great deformity, such as loss of the entire tip of the nose, may result. The disease has little tendency to spontaneous healing, but during the periods of inactivity fatty degeneration and absorption of the centre of the diseased mass may occur, leaving in time a thin, atrophic, parchment-like cicatrix surrounded by a border of disease.

Accessory factors, such as position, extent, amount of infiltration, the

soil and complications, give rise to variations in the type of the disease. Kaposi has applied the term *lupus disseminatus* to those cases in which the lesions are scattered, usually asymmetrically over the body. *Lupus ulcerosus* may become covered with thick, greenish crusts, and as a result of a mixed infection may fungate in the case of the nose, giving a cauliflower-like aspect. When firm œdema of the diseased tissue (lymph stasis) occurs in addition to lupus infiltration, the hypertrophic variety is seen. Its seats of predilection are the lips and buttocks. When instead or as a result of œdema the plaque becomes hard from

FIG. 2.



Lupus vulgaris, with growth of giant cells.

connective-tissue increase, we have *lupus sclerosus*. *Lupus acutus* is a term applied to the disease when the process is actively extending. Papillomatous lupus has been spoken of, and verrucous disease properly belongs to another category.

On the mucous membranes, which it involves in about 30 per cent. of cases according to the figures from Doutrelepout's clinic, the lesion is papillomatous, covered with gray, exfoliating epithelium. Implication of the mucous surface is rarely primary, usually by extension from the skin. The lips and palate are favorite sites for its development. Sharply-

defined ulcers, resulting from necrosis of the gray patches, are common, and cicatrization is apt to result in considerable deformity, not unlike that produced by ulcerating syphilides. It may involve the external auditory meatus, the lining of the pharynx, and the female genitalia.

Lupus may be complicated by various other tuberculous manifestations and by a systemic disturbance observed by Lespinnes (*Journ. des Mal. Cut.*, vol. iii. p. 531), very similar to that produced by injections of tuberculin. The symptoms are rise of temperature, bronchial and gastro-intestinal catarrh, and even endocarditis. It is possibly caused by toxin absorption. A grave complication of lupus in adults, epithelioma, has not been observed in children. It usually occurs in cases of long standing, and is rapidly fatal.

Scrofuloderma in modern terminology is restricted to the tuberculous lesions which develop in the subcutaneous tissue. It is usually the result of extension from neighboring foci of disease, lymphatic or osseous, and involves the skin only secondarily. It is doubtless as familiar to pediatrists as to those in dermatological practice, and I shall not stop to describe it here.

It is a long jump in point of frequency from lupus and scrofuloderma to the three remaining forms, in the adult; in children their rarity is such as to make them very nearly negligible quantities in diagnosis.

Tuberculosis vera is the name given by dermatologists to a form of tuberculous ulceration usually seen at the junction of skin and mucous membrane, as on the lips particularly, at the anus, nasal orifices, and vulva. It begins in the form of a papulo-pustule, which soon breaks down, forming a shallow ulcer with an irregular, undermined border and an uneven, grayish floor dotted with yellowish-white tubercles. It is usually covered with a thick crust. There is no tendency to healing; the process spreads peripherally until a maximum diameter of two inches is attained. The patients are usually cachectic, with evidence of tuberculosis in the internal organs. This ulceration occurs also on the mucous membranes, as of the tongue and larynx. A form of tuberculosis of the subcutaneous tissue, the scrofulous gummata (*gommes scrofuleuses* of the French), may be mentioned here, although it is more properly classed with scrofuloderma. It differs from the latter in originating in the subcutaneous tissue, not resulting from extension of neighboring foci of disease. Like scrofuloderma, it involves the skin secondarily. Tubercle formation begins in the connective tissue, the granuloma increasing in size until its diameter becomes an inch or more. The color is a livid, bluish red; the tumor is at first hard and freely movable under the skin, but later is attached to it, undergoes central necrosis, and may finally open outward, showing a deep, jagged ulceration. The gummata occur in strumous children, chiefly on the buttocks, back, thighs, and legs. Many of you have undoubtedly seen

the condition as a sequel of an acute exanthem, notably measles. It occurs as a secondary development in tuberculous lymphangitis.

Tuberculosis verrucosa (McCall Anderson's scrofuloderma verrucosum) in childhood is represented in my experience by two cases, both of which were seen in the New York Hospital. In this instance the result of the activity of the tubercle bacillus is not ulceration, but the papillary outgrowth which gives it its name. The primary lesion in adults, doubtless in children also, is the post-mortem wart, *verruca necrogenica*. There may be one or several lesions, the resemblance to an ordinary wart with the addition of a dull-red areola being very striking. Spreading peripherally, the growth may attain considerable size. Three border-zones in a fully developed patch can be made out, the outer erythematous merging gradually into the healthy skin, the middle dotted with minute pustules from which pus can be expressed, and the inner consisting of the warty outgrowths. The centre behind the advancing edge is usually flattened, and finally results by absorption of the diseased mass in atrophic scarring. In the two cases referred to the three zones were not present, warty outgrowths covering the patches scattered over face, trunk, and limbs.

Miliary tuberculosis, so far as the writer's knowledge extends, has been reported in one instance only,[1] but that is of sufficient interest to warrant a short review of its points. Leichtenstein's patient, a boy, aged four years (*Münch. Med. Wochenschr.*, 1897, No. 1, p. 1) developed first a pulmonary tuberculosis which became generalized, and of which he died. In the course of the fourth week a discrete papular eruption appeared on the trunk, face, and limbs. The lesions were small, hard, red, rounded or acuminate, and clearly marked off from the surrounding skin. Successive outbreaks occurred, lasting eight to fifteen days, when the papules would disappear. The number of lesions in each relapse was never more than twelve or fourteen, but the recurrences followed each other closely. The papules occasionally became vesicular or pustular, and after resolution left a desquamating surface.

Etiology. As in other microbic infections, the seed and the soil must be taken into careful account. The tubercle bacillus is the exciting cause of these five types of disease. Their clinical features depend on the individual peculiarities of the skin and system generally of the patient, perhaps to some extent, also, on the virulence and mode of inoculation of the micro-organism.

Lupus vulgaris, as a rule, begins in childhood; but the exceptions are quite numerous, the disease appearing sometimes late in life. The reason is found probably in the greater vulnerability of the skin in

[1] Since this was written Kaposi has reported several cases at the Twelfth International Congress.

early youth. Lupus progresses most rapidly then. Inoculation is usually indirect. The nodules, for example, may appear in the scars of scrofuloderma, at the borders of tuberculous fistulæ, and over diseased bones and glands. In the latter case, it sometimes happens that infection of the skin takes place through the lymphatics without involvement of the intervening tissues. Direct inoculation on tattoo marks, by ear-rings, etc., has been proved in a number of cases.

Tuberculosis vera and verrucosa are almost invariably the result of direct inoculation. The first, with the tuberculous ulcers of the mucous membrane, is an auto-infection from secretions swarming with bacilli which pass over them from the lungs, intestines, or genital organs. Verrucous tuberculosis usually results from hetero-inoculation, though the hands may be infected, for example, from the sputa or the penis in ritual circumcision. It is seen commonly in those who handle dead, tuberculous animal matter. Its occurrence in the two children referred to is difficult to understand. I have no theory to offer.

It may be said that no conclusive proof has hitherto been adduced of an increased proportion of cutaneous tuberculosis in the offspring of diseased parents. Congenital tuberculosis is at least extremely rare. Association with pulmonary infection, whether with or without a causal relation, is an accepted fact in a proportion too large to permit its being regarded as a coincidence. Leloir found it 98 times in 312 cases; Haslund in 60 per cent.

Diagnosis. The salient characteristics of lupus are its beginning in childhood, its long and tedious course, the formation near the patches and in the scars of the peculiar apple-jelly nodules. It is most frequently mistaken for syphilis, and even with the aid of the microscope diagnosis is often impossible except after long watching of the case. The history and the therapeutic test, in the writer's opinion, are practically valueless. If the tubercle bacillus is found the question is settled; but the most patient search may go unrewarded. It is often said that the bacillus does not occur once in 200 sections. Lupus erythematosus is more superficial, does not ulcerate, and does not show the nodules. Verrucous tuberculosis may be confounded with common warts, with syphilis, and eczema. The microscope will make the diagnosis with ease in the first case; its course and the clinical features enumerated, in the second; an eczema never leaves a scar, and spreads by peripheral extension, not by development of new lesions in the neighborhood. Lepra and sarcoma might be confounded with cutaneous tuberculosis. Tuberculous ulcerations are distinguished from syphilitic by their slow development, the presence of miliary tubercles and of the tubercle bacillus.

Culture experiments and the microscope furnish exact methods of diagnosis in the forms where the bacillus occurs in numbers—*i. e.*, in

scrofuloderma, verrucous, ulcerative, and miliary tuberculosis, but the case is different in lupus vulgaris. Not only are the histological features very similar to those of certain superficial syphilodermata, but bacilli occur so sparsely that culture almost always fails. Reliance is best placed on the points given.

Pathological Anatomy. The lesions of all the types are neoplasms of granulomatous character. Kaposi's description of the histopathology of lupus still remains the best. The nodule begins in the deeper part of the corium, and consists of cells, leucocytes, and proliferated connective-tissue corpuscles, embedded in a delicate fibrous reticulum, supplied by numerous, dilated vessels. The infiltration later becomes more dense, giant cells appear, the blood-supply is cut off by pressure, and central necrobiosis takes place. The result of this tissue death is absorption and atrophic scarring, or, in case extension has involved the epidermis, ulceration. The foci usually spread along the course of the vessels. When the epidermis is involved the prickle cells proliferate and the interpapillary projections are widened and lengthened. The boundary line disappears gradually and, by tissue loss through desquamation or suppuration, ulceration occurs. When connective-tissue proliferation takes place lupus sclerosus develops; when the papillæ enlarge a verrucose condition results; occasionally epithelial proliferation is excessive, and it is in this way that epithelioma begins. Tubercle bacilli are to be seen, but very few in number and usually within the giant cells. When found after a search through 100 sections or more, they are often single or occur in twos and threes.

In the four other varieties the pathological findings do not differ greatly from each other. The greater portion of diseased material is granulation tissue composed of leucocytes, epithelioid, and giant cells. Tubercle bacilli occur in great number in all of the lesions, from which they may easily be cultivated and inoculated. Scrofuloderma is a tuberculosis of the subcutaneous connective tissue. The tubercles coalesce, invade the corium and epidermis, ulcerating finally by cell necrosis through the latter. Tuberculosis vera is exactly the same process beginning more superficially and progressing more rapidly. The latter bears close analogy to miliary tuberculosis elsewhere.

In verrucous tuberculosis the corium is invaded by the same granulation tissue, but there is a tendency to epidermic prolifieration rather than ulceration. The papillæ are greatly elongated and broadened, with corresponding hypertrophy of the interpapillary prolongations. The surface is covered by thickened layers of horny cells which, following the dipping between the papillæ, give rise to the appearance of verrucosity. Here and there, where epidermic proliferation is greatest, may be seen minute pustules. When present they finally burst superficially, and the pits left become filled with horny masses of epidermis.

The number of tubercle bacilli is greater than that in lupus, less than in tuberculosis vera.

In the single case of miliary tuberculosis the papules were found to consist of tubercles situated in the papillary layer and containing numerous bacilli. A secondary infection by pus-organisms accounted for the pustulation.

PROGNOSIS. This is more or less unfavorable in all forms. In tuberculosis vera and miliaris the danger is to life itself, since they may justly be regarded as part of a grave systemic infection. All forms are rebellious to treatment, prone to relapse, and show no tendency to spontaneous healing. A scar is, moreover, the invariable result with the best of treatment. Left untreated, the disease may continue and progress indefinitely. Prognosis is modified by the variety: lupus is much more difficult to cure than scrofuloderma or verrucous tuberculosis. Possibility of general infection from the skin lesion should always be borne in mind.

TREATMENT. Specific treatment in the shape of tuberculin may be dismissed, it may be said, with little fear of contradiction, as a complete failure at present. I have never seen the remotest good result from its use. Prophylaxis should not be neglected. Those who have a tendency to the development of tuberculosis should be hedged about by every hygienic precaution; the skin should not be exposed to contact with the virus, and should be antiseptically cleansed when so exposed; it should be protected when possible by destruction of underlying disease. There is no need to dilate upon the necessity for general hygienic and therapeutic measures. These are the same and equally important in the skin as in other organs.

Chief reliance must, after all, be placed on local treatment. It may be summed up in one word—removal. The means to that end are limited only by the bounds of human ingenuity. The ideal method, advocated by Lang, of Vienna, is *excision* and grafting; but, unfortunately, this is limited to small areas, and the disease is apt to return even then. *Curetting* with a Volkmann spoon or curette offers certain advantages, notably the aid to the operator, in the feeling of resistance given by healthy tissue. It is most useful in large areas, and should then be done under general anæsthesia. *Linear scarification* may be done with local anæsthetics by means of a single blade or a scarificator consisting of several parallel cutting edges. While not curative in itself, this method offers advantages as an adjunct to other treatment. The scarifications are done in parallel lines and crossed at right angles. It is useful in locations, lips or ears, difficult of access to other means. A further advantage is that it produces a soft, supple cicatrix; objections to it are the long duration of treatment and possibility, in common with other surgical methods, of general infection through lymph chan-

nels. It is particularly applicable in lupus sclerosus. *Cauterization* may be done with the Paquelin or electro-cautery, or by chemicals. The first is useful in large areas; the second, in picking out single nodules deep in the cutis or recurring in a cicatrix. *Chemical cauterization* is a method not in great vogue in this country. Arsenical pastes, Vienna or Marsden's, destroy the diseased parts, but should not be used over areas greater than one and a half inches square. They are excessively painful. Silver nitrate in solution or solid may leave a permanent stain in the skin. It is impossible to limit the action of zinc chloride; salicylic acid is useful only to remove thickened epidermis; carbolic acid has no value. Pyrogallic acid (paste, 10 per cent.) acts only upon foci of disease. *Electrolysis* may be used to destroy isolated lesions.

Success in treatment is largely a question of the skill shown in selection and carrying out of the method. No single mode can be followed successfully, and often resort must be taken to all in one case before success is assured. For example, a large ulcerated plaque of lupus on the cheek or tuberculosis verrucosa on the hand may be curetted thoroughly and the actual cautery applied to the pockets of disease. The wound may be dressed antiseptically or covered with a layer of pyrogallic ointment (there is danger of intoxication from the latter if too large a surface be attacked). The acid destroys disease which has escaped the scraping and cauterization. When a clean surface is secured it is allowed to granulate, plasters (mercury) or the solid stick restraining exuberant granulation. After the scar has formed it may be scarified to make it soft, and recurrences may be destroyed by electrocautery or electrolysis. Fortunately, we have now at hand a means of reducing the hideous, puckered cicatrices of cutaneous tuberculosis in thiosinamin. A 10 per cent. solution in glycerin and water is injected hypodermatically every second or third day in 10-minim doses.

II. Paratuberculoses.

In 1894 Fournier published in Paris a book which he called *Les Affections Parasyphilitiques*. By the term he means affections not necessarily syphilitic in themselves, but developing and flourishing upon a specific basis. The step is not far from syphilis to tuberculosis in pathology, and by analogy it is not strange that there should be a crowd of diseases with a thoroughly recognized relationship to the latter, in spite of the fact that Koch's bacillus is only very rarely found in their lesions, even then probably resulting from accidental contamination. Many efforts have been made of late to find and fix a place for the paratuberculoses, notably during the Congress of Dermatologists last year in London, by Hyde, Hallopeau, Crocker, and others. (The name I have used was not suggested—in fact, none was given—but it seems to fit the case.)

Very few dermatologists are ready to accept as corollaries to tuberculosis all the diseases so designated by Hyde and Hallopeau. Tommasoli appears to have the right of the question when he says that it is a mistake to consider that dermatoses, such as Hebra's pityriasis rubra, general ichthyosis, dermatitis exfoliativa, eczema even, have any causal relationship with tuberculosis other than that, in the impairment of the resisting powers following a long-standing disease of this kind, the bacillus finds its entrance easier and its soil more favorable. Upon one point, although the guess is at present a hazardous one, opinions, in a majority of observers, are apparently agreed, viz., that the origin of the diseases commonly accepted as paratubercular is toxinic. They are, in all likelihood, due to the action of poisons derived from distant foci of disease.

For convenience, those diseases concerning whose title to a place here there is little dispute may be ranged in three subdivisions: (1) the scrofulides; (2) the tuberculides; and (3) hyperchromia. The scrofulides, first described by Duhring, are pyodermic affections which, if toxinic in origin, are so probably in the sense that pus organisms are more easily inoculated upon a skin weakened in resisting power by circulating poisons. In this scheme they include:

a. The small pustular scrofulide.

b. The large pustular scrofulide.

c. Certain suppurative folliculites.

The second subdivision, called tuberculides by Darier, includes, in his classification, a number of affections which may be narrowed to

a. Lichen scrofulosorum.

b. Acne cachecticorum.

c. Erythema induratum scrofulosorum.

d. Grouped folliculitis.

e. Possibly the disease usually described as hydradenitis.

f. Lupus pernio.

The first three are typical paratuberculoses. Kaposi says one of the diagnostic points in lichen scrofulosorum is its occurrence in the tuberculous. The origin of *d* and *e* is more than doubtful. None of these diseases are commonly pustular, but they may become so by accidental contamination. In this way they are separated from the scrofulides, which are pure pyodermias.

The last class includes but one affection, a hyperpigmentation, a "pigmentary dysgenesis" common to various cachexias, of syphilis, cancer, paludism, alcoholism, diabetes, as well as of tuberculosis. In this instance it may aptly be called the pigmentary tuberculide in analogy with the pigmentary syphilide. Fournier (*Les Affections Parasyphilitiques*) describes a case[1] in a young girl, which could be distin-

[1] Some eighteen others have been reported by various observers.

guished from the specific dyschromia only with the greatest difficulty. The pigment is derived from the blood originally, but its chemical composition is changed. Once deposited in epithelial cells, for which it has a special predilection, it is practically ineradicable.

None of the paratuberculoses are common in practice. I shall consequently describe briefly only the scrofulide, lichen scrofulosorum, and erythema induratum. Their importance lies in the fact that they are easily mistaken for syphilides, as pointed out by Hutchinson.

The members of the first group rarely occur singly in a pure state. The eruption is generally constituted of large and small pustules, frequently beginning as a perifollicular inflammation. Moreover, they are often seen complicating the tuberculides. The initial lesion may be a papule, but is usually a vesico-pustule. They may be large or small, follicular or not, grouped or irregularly scattered over the back, buttocks, legs, thighs, and arms. When large, the pustules may coalesce and become covered with thick crusts. Whether large or small a depressed cicatrix is apt to result. The course is slow and indolent. Stanley (*Brit. Journ. of Derm.*, Nov., 1893) published a case, a boy aged fourteen years, in whom the eruption was recurrent and displayed its greatest activity when tuberculosis of the cervical glands was most active. The patient progressed favorably under cod-liver oil internally and externally by inunction.

Lichen scrofulosorum is the type of the paratuberculoses. It occurs almost invariably in tuberculous patients, and very rarely does the bacillus appear in the lesions. The controversy over its presence, according to Pellizarri, arises from the fact that the toxins prepare the soil for its entrance. No improvement has been made on Hebra's original description. The eruption is extremely chronic, and consists of grouped, small, firm, flat, livid-red papules disseminated over the back, abdomen, and thighs. They may be capped by a fine scale or a tiny pustule. At first they are isolated, but become closely grouped later. The patches are not large, and may have a crescentic outline. In Austrian statistics 99 per cent. of cases showed other evidences of struma. The affection is encountered between infancy and puberty, never after the twentieth year. The papule is formed by an inflammatory infiltration about the pilo-sebaceous follicle. On involution it leaves pigmentation or faint scars.

Colcott Fox (*Brit. Journ. of Derm.*, Nov., 1895) has described several cases of a disease which he called "acne scrofulosorum in infants," and which is in all probability identical with Hebra's acne cachecticorum. His description is as follows: "The eruption is an indolent, small, papulo-pustular or acneiform one in infants, disseminated sparsely and without grouping and unaccompanied by subjective symptoms. It affects the lower limbs and buttocks, chiefly on their extensor surfaces.

The lesions appear successively or by a subacute outbreak. The papules are inflammatory, seated about a hair-follicle and acuminate in the early stage. They mostly develop a crown of pus, . . . and in involution become flattened and leave stains or scars." This is not very different from the lichen just described. In fact, as I have said, they and the pustular scrofuloderm may flourish on the same soil.

Erythema induratum (Bazin's *erytheme indure des scrofuleux*) is an interesting affection, not so uncommon as the others. I cannot do better than describe one of my own cases, which is typical of the milder form. The patient was a girl, aged twelve years, of unhealthy appearance and with enlarged cervical glands. The father had a history of tuberculosis. The skin of the lower extremities was of a livid color, cold and œdematous. Here and there, chiefly on the anterior aspects, were numerous nodules, some projecting above the surface, others only to be felt beneath it. Over the larger the skin showed a reddish tint and one had spread externally by a small punched-out mouth through which a thin pus was discharged. The disease was painless and indolent, with little tendency to healing. In graver cases multiple ulcers are formed, the openings of which may be connected by subcutaneous fistulæ. In my case the disease began at puberty. She recovered under tonic treatment and local antisepsis.

In conclusion, let me urge members of the profession to report the cases of cutaneous tuberculosis which they see in practice, of whatever kind. They are very few in dermatological clinics, and much light is needed upon the subject still, particularly in the case of the paratuberculoses.

HEREDITY IN PHTHISIS.

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On December 11, 1894, I read a paper before the Royal Medical and Chirurgical Society of London on "The Influence of Heredity in Phthisis," in which I compared the incidence of this disease on the children of phthisical parents with that on the children of non-phthisical parents living under similar conditions. In that paper I showed that in 275 families in which there was no phthisis in the parents, comprising a total of 1745 children, 24.87 per cent. of these became phthisical; while in 199 families of phthisical parents, with a total of 1182 children, 33.71 per cent. of the children became phthisical. This gives a difference of only about 9 per cent.

I pointed out that this comparatively small excess in the incidence of phthisis on the offspring of phthisical parents might well be accounted for by the greater exposure to infection of those whose parents were phthisical, since these were living with infected persons.

The general argument was, briefly stated, as follows: The children of parents who are in poor health—whether from phthisis or because of unhygienic surroundings or from any other cause—are likely to be themselves weakly, and thus predisposed to contract any disease to the infection of which they may be exposed. If the ill-health of the parents is due to phthisis, their delicate children, being constantly exposed to the infection of tuberculosis, are liable to become tuberculous. They do not *inherit* tuberculosis, but are more exposed to infection of this disease than those who do not live with consumptives.

If this view be correct, its importance from the point of view of prophylaxis is considerable.

I have now completed the statistical examination of 1000 families—a sufficient number to give some value to the result, since these families comprise over 6400 children. In this paper I propose to analyze the figures obtained from the 526 cases tabulated since my last paper was published and the results of the total of 1000 families. For the sake of comparison, and to give completeness, I have drawn out tables (III. and IV.) showing the results given in the Medico-Chirurgical paper (correcting one or two errors which escaped notice in revising the proofs for publication) side by side with the figures of this second series and the total for the two series combined. The results obtained from this larger number of cases will be seen to differ but slightly from the figures published in 1894.

The influence of heredity in the causation of tuberculosis, and especially in the causation of consumption, has been held to be very great. So powerful has this influence been considered that it has been used as an argument against the proposals for prophylactic measures which are advocated by sanitary officers and others. The members of consumptive families also have felt that escape from the disease is well-nigh impossible, and meet suggestions for prevention with the reply, "It is no good in my taking precautionary measures; the disease is in my family." Nevertheless, it seems to me that the facts about heredity in consumption, properly considered and understood, furnish a strong argument in favor of prophylactic measures against tuberculosis. I have on previous occasions expressed the belief that the influence of heredity in tuberculosis has been overestimated, and that among the general public the nature as well as the extent of this influence is misunderstood. It is clearly the duty of the medical profession to educate the public on matters affecting disease-causation, so that preventive means may be accorded the approving help of the public instead of

being met with the obstruction or apathetic indifference with which ignorance receives all prophylactic suggestions and regulations. In tuberculosis especially is it essential that attempts at prophylaxis should be seconded by the public. Without such co-operation the medical profession can do little or nothing; with the intelligent and willing help of all concerned tuberculosis may be practically stamped out and consumption become as rare as smallpox is now. One great obstacle to the general acquiescence in measures directed against the spread of tuberculosis is the widespread belief in the hereditary nature of consumption. Statistics are proverbially unreliable, and statistical evidence has been used to illustrate the influence of heredity in consumption. I shall make use of this same uncertain weapon to combat the inferences generally deduced from the statistics of heredity; and if I am told that my figures *prove* nothing, I am content to accept this criticism, for my object is in part obtained by showing that statistical evidence—whatever it may be worth—is not without exception in favor of the strong influence of heredity in phthisis. With regard to my figures, it may be argued with justice that the information obtained from patients as to the medical history of other members of their families is unreliable; yet the same sources of fallacy exist in the cases where the parents were consumptive and in those in which the parents were non-phthisical, so that a comparison between the two classes may still be a fair one. It is because this element of uncertainty in the correctness of the medical history makes any pretension to scientific accuracy impossible in such an inquiry as this that I have preferred to use such indefinite terms as "consumption" and "phthisis" rather than the more exact expression "pulmonary tuberculosis." Before reviewing the figures which I have to submit let us briefly examine the nature of some of the evidence of hereditary influence. The chief argument in favor of the powerful influence of heredity is that in so many cases of tuberculosis one or other of the patient's parents suffered from the same disease, or that the disease affected the grandparents, uncles, aunts, or cousins. In many of the cases where the parents were phthisical it would be found that they did not become so until after the birth of the patient; and in these cases, as in those where the parents were never affected, atavism is brought forward to explain the hereditary transmission of the taint. Something more, however, than the occurrence of a particular disease in several members of successive generations of a family is required to establish heredity, or we might consider measles an hereditary disease. Congenital tuberculosis—tuberculosis in the fœtus or newly-born children—is so rare that the hereditary influence cannot be considered to take the form of direct transmission of the disease. To bring the later onset of the disease into line with the theory of heredity we require to imagine an exceptional period

of latency in tuberculosis, which is still only a supposition. If the disease were implanted in the fœtus, remaining latent until called into activity by some accident, we should not expect it to remain inactive through the period of teething and the various ailments of childhood only to declare itself in early adult life—the period when consumption most commonly commences. Evidently, then, it must be a *tendency* to the disease which is transmitted, not the disease itself; and if we can show — as has frequently been shown — that this tendency may be counteracted, we have a powerful argument in favor of the employment of prophylactic measures. Granting that the members of a consumptive family have a special tendency to tuberculosis, which tendency can be counteracted and removed by certain means, how can we hesitate to employ these means when the disease to be prevented is so fatal?

But, as I attempted to show in my paper at the Royal Medical and Chirurgical Society, in 1894, it is not certain that any specific tendency to tuberculosis is transmitted. It is possible—and, as I think, probable —that what is transmitted by consumptive parents is a want of strength to resist illness of any kind; a general delicacy of constitution which renders the individual a ready prey to any disease. Such a person living with a consumptive (it may be a parent) is likely to become consumptive, not because of any specific tendency, but because, being constitutionally non-resistant, he contracts the disease to the infection of which he is exposed, and in this case it is tuberculosis. Some support for this contention may be found in comparing the proportion of cases in which heredity is claimed among 1000 hospital patients and among 1000 private patients. In the first report of the Brompton Consumption Hospital, out of 1010 patients of the poorer classes one or both of the parents were phthisical in 242 cases, or 24 per cent. Among the private patients (well-to-do persons) of Dr. Theodore Williams—one of the physicians to the Brompton Hospital—1000 cases gave a history of phthisis in the parents in 120 instances, or 12 per cent.—only one-half of the proportion found among the poorer patients. Either heredity is not a potent influence—otherwise it would affect both classes equally— or the hereditary influence is counteracted by healthy living. Either inference gives hope for preventive medicine.

But even the limited influence of an inherited tendency does not appear to me to be so great as would appear from the statistical expression of heredity in consumption which is usually employed. It is commonly stated that an hereditary influence may be found in from 25 to 30 per cent. of all cases of consumption if inheritance from parents alone is taken into consideration, and in about 60 per cent. when phthisical grandparents, etc., are considered.

In the paper already referred to I collected from various sources the following figures: Out of 12,509 cases of consumption the parents were also phthisical in 3101 cases, giving a "percentage heredity" of 24.79. In 12,146 consumptives there was a history of phthisis in the family (parents, grandparents, uncles, or aunts) in 7563, or a "percentage heredity" of 62.34. But in all these cases the figures were arrived at by getting from the patient the history of the preceding generation of the family, and wherever consumption had occurred in even one member of the family the case was classed as an instance of heredity. We only require to carry the family history back another generation or two to find some "hereditary influence" in almost every case. That this method of inquiry gives a misleading idea of the influence of heredity I endeavored to demonstrate, and set myself to work out the hereditary influence in a different manner. Starting with the consumptive individual, I traced his offspring instead of his ancestors, and noted how many of his children subsequently became phthisical and how many remained free from tuberculosis. This led to a somewhat unexpected result, for the figures by which the percentage heredity was now expressed—viz., 33.71—were closely similar to those obtained by the other method of inquriy, viz., 32.5. We may conclude, therefore, that among the class from which these patients are derived—the poorer classes, who make use of hospital assistance—about one-third of the offspring of consumptive parents will subsequently become tubercular, and that in about one-third of the cases of consumption among such classes we shall find a history of phthisis in the parents.

This, however, is far in excess of what Dr. Theodore Williams found among his private patients. I then checked my results by an inquiry into the proportion of the offspring of non-phthisical parents, in the same condition of life as my other cases—*i. e.*, hospital patients—who eventually became consumptive. In this way I obtained a numerical expression of the influence of occupation and mode of life, for in these cases the influence of heredity was absent.

Clearly, also, the influence of the consumptive parent in the causation of phthisis in his offspring (whether this influence be hereditarily transmitted or not) would be expressed by the increased incidence of consumption on the offspring of phthisical parents, all the cases being drawn from families in the same station of life.

This is shown in the following table (Table I.).

TABLE I.—SHOWING THE INCIDENCE OF PHTHISIS IN THE CHILDREN OF NON-PHTHISICAL AND OF PHTHISICAL PARENTS RESPECTIVELY.

1000 families.	Children.		Died in infancy.		Phthisical.	
	Total number.	Proportion to each family.	Total number.	Per cent. of whole.	Total number.	Per ct. of children omitting infantile deaths.
A. 673 families with *no* phthisis in the parents	4488	6.66	522	11.63	938	23.65
B. 143 families. Father phthisical	925	6.25	126	13.62	249	31.16
C. 135 families. Mother phthisical	826	6.11	78	9.44	245	32.75
D. 44 families. Both parents phthisical	218	4.95	28	12.84	82	43.15
Summary of B, C, D, 327 families One or both parents phthisical	1969	6.02	232	11.78	576	33.16

As will be seen from these results of inquiries embracing 1000 families this table shows:

Percentage of the offspring of *phthisical* parents subsequently becoming tubercular	33.16
Percentage of the offspring of *non-phthisical* parents subsequently becoming tubercular	23.65
Percentage of influence due to parents, or "percentage heredity" . .	9.51

We may then take it as demonstrated that consumptive parentage affects less than 10 per cent. of the offspring.[1]

But how much of this comparatively small excess of phthisis in the offspring of consumptives may properly be put down to heredity is still open to question. We know that tuberculosis depends upon the presence within the body of the bacillus tuberculosis; and while the direct transmission of the micro-organism from the parent to the *fœtus in utero* is almost unknown, there is abundant evidence that the bacillus may gain entrance into the body from without, in the air and in the food, as well as in other ways. Probably the great majority of persons now hold the opinion that infection is the chief factor in the causation of tuberculosis. I would express the matter by stating that infection is the only essential factor in the causation of tuberculosis; but, though the most robust may become tubercular if exposed for some time to intense infection, there are certain conditions which render a person liable to become infected from even a slight degree of infection. Of these predisposing causes, inherited weakness of constitution is one. That such inherited predisposition may be counteracted is shown by

[1] It is interesting to note how nearly this agrees with the percentage heredity given by Dr. Theodore Williams for his private patients, who were free from the adverse influence of occupations and surroundings which affect the hospital patients.

many well-known cases—such as the family record by Dr. Hermann Weber, in the Croonian Lectures for 1885—and is also evidenced by the fact that two-thirds of the offspring of consumptives escape the disease. But when an individual with inherited delicacy is living in a close and intimate relation with a consumptive there is so great a risk of infection that the extra 10 per cent. of consumptives in the offspring of tubercular parents—as shown in my figures—may easily be thus accounted for.

TABLE II.—SHOWING THE INCIDENCE OF PHTHISIS ON THE TWO SEXES IN THE CHILDREN OF NON-PHTHISICAL AND OF PHTHISICAL PARENTS RESPECTIVELY.

1000 families.	Children.		Died in infancy.		Phthisical.	
	Total number.	Proportion to each family.	Total number.	Per cent. of whole.	Total number.	Per ct of children omitting infantile deaths.
A. 673 families with *no* phthisis in the parents . . .	M. 2448 F. 2040	3.63 3.03	310 212	12.66 10.39	565 373	26.24 20.40
B. 148 families. Father phthisical	M. 475 F. 450	3.20 3.04	69 57	14.52 12.66	110 139	27.09 35.36
C. 135 families. Mother phthisical	M. 399 [1] F. 420	(2.95) (3.11)	41 [1] 30	(10.27) (7.14)	126 119	35.19 30.51
D. 44 families. Both parents phthisical	M. 108 F. 110	2.45 2.50	15 13	13.88 11.81	40 42	43.01 43.29
Summary of B,C,D, 327 families One or both parents phthisical	M. 982 [1] F. 980	(3.00) (2.99)	125 [1] 100	(12.72) (10.20)	276 300	32.20 34.09

When we examine the incidence of the disease on the two sexes under the various circumstances (Table II.) we see again further reason to attribute the excess of consumption in the offspring of phthisical parents, not to heredity, but to infection. Among the offspring of the non-phthisical parents it is the males who become consumptive in greater proportion. In this case we see the influence of occupation and the greater risk of infection to those who go out into the world over those who remain at home. When, however, there is phthisis in one or both of the parents, we see the extra risk to those who remain at home, shut up, so to speak, with a consumptive. It is among the female offspring of phthisical parents that the disease shows itself in greater proportion, the exposure to infection at home outweighing the risks of occupation and exposure at work. We note that the incidence of phthisis among the male offspring of phthisical parents (32.2 per cent.) is about six per cent. more than that among the male offspring of non-phthisical parents (26.4 per cent.); while among the

[1] In over seven sex not stated.

female offspring nearly 14 per cent. more become consumptive among those belonging to phthisical families (34.09 per cent.) than among the children of non-phthisical parents (20.4 per cent.). Does not this furnish a strong argument in favor of infection, rather than heredity, as the means of transmission from parent to child? The consumptive father goes out to his work during the earlier part of his illness, and is therefore not so much in contact with the other members of the family. The mother is always at home, and so becomes a constant source of infection to the family from beginning to end of her illness. The effect of this is seen in the increased incidence of consumption when the mother is phthisical. When both parents are consumptive the risk of infection is materially increased, and the proportion of the offspring who become phthisical is large. Not only is infection intense, but the non-resistance of the offspring is greater when both parents were weakly.

There are many other interesting deductions which might be made from these figures, but I am unwilling to obscure my main argument by following up side issues. There is, too, a danger of utilizing figures to prove preconceived theories. I commenced this inquiry without any special theory of the hereditary influence in phthisis, and was led to question the potency of direct heredity by my figures. I am, therefore, the more anxious to avoid the attempt to make my figures prove too much.

TABLE III.

1000 families.		Children.		Died in infancy.		Phthisical.	
		Total number.	Proportion to each family.	Total number.	Per cent. of whole.	Total number.	Per ct. of children omitting infantile deaths.
A. Parents non-phthisical.							
Med. Chir. . . .	275	1745	6.34	193	11.06	386	24.87
Second series . . .	398	2743	6.89	329	11.99	552	22.86
Total . . .	673	4488	6.66	522	11.63	938	23.65
B. Father phthisical.							
Med. Chir. . . .	84	511	6.08	67	13.11	138	31.08
Second series . . .	64	414	6.46	59	14.25	111	31.26
Total . . .	148	925	6.25	126	13.62	249	31.15
C. Mother phthisical.							
Med. Chir. . . .	82	506	6.17	56	11.06	155	34.44
Second series . . .	53	320	6.03	22	6.87	90	30.20
Total . . .	135	826	6.11	78	9.44	245	32.75
D. Both parents phthisical							
Med. Chir. . . .	33	165	5.00	18	10.90	58	39.45
Second series . . .	11	53	4.81	10	18.86	24	55.81
Total . . .	44	218	4.95	28	12.84	82	43.15
Summary of B, C, and D.							
Med. Chir. . . .	199	1182	5.93	141	11.92	351	33.71
Second series . . .	128	787	6.14	91	11.56	225	32.32
Total . . .	327	1969	6.02	232	11.78	576	33.16

TABLE IV.

1000 families.		Children.		Died in infancy.		Phthisical.	
		Total number.	Proportion to each family.	Total number.	Per cent. of whole.	Total number.	Per ct. of children omitting infantile deaths.
A. Parents non-phthisical.							
Med. Chir.	275	M. 947	3.44	111	11.72	244	29.18
		F. 798	2.90	82	10.27	142	19.83
Second series	398	M. 1501	3.77	199	13.25	321	24.65
		F. 1242	3.13	130	10.46	231	20.77
Total	673	M. 2448	3.63	310	12.66	565	26.42
		F. 2040	3.03	212	10.39	373	20.40
B. Father phthisical.							
Med. Chir.	84	M. 267	3.17	39	14.60	62	27.19
		F. 244	2.90	28	11.47	76	35.18
Second series	64	M. 208	3.25	30	14.42	48	26.96
		F. 206	3.21	29	14.07	63	35.59
Total	148	M. 475	3.20	69	14.52	110	27.09
		F. 450	3.04	57	12.66	139	35.36
C. Mother phthisical.							
Med. Chir.	82	M. 245	3.00	33	13.41	84	39.43
		F. 260	3.17	23	8.84	71	29.95
Second series	53	M. 153	(2.88)	8	(5.22)	42	28.96
		F. 160	(3.01)	7	(4.37)	48	31.37
Total	135	M. 399[1]	2.95	41[1]	(10.27)	126	35.19
		F. 420	3.11	30	(7.14)	119	30.51
D. Both parents phthisical.							
Med. Chir.	33	M. 84	2.54	12	14.28	28	38.88
		F. 81	2.45	6	7.40	30	40.00
Second series	11	M. 24	2.18	3	12.50	12	57.14
		F. 29	2.63	7	24.13	12	54.54
Total	44	M. 108	2.45	15	13.88	40	43.01
		F. 110	2.50	13	11.81	42	43.29
Summary of B, C, and D.							
Med. Chir.	199	M. 597	3.00	84	14.07	174	33.91
		F. 585	2.93	57	9.74	177	33.52
Second series	128	M. 385[1]	(3.00)	41[1]	(10.64)	102	29.65
		F. 395	(3.08)	43	(10.88)	123	34.94
Total	327	M. 982[1]	(3.00	125[1]	(12.72)	276	32.20
		F. 980	(2.99	100	(10.20)	300	34.09

I am content to claim that—as shown by the small difference between the incidence of consumption on the offspring of phthisical and non-phthisical parents, respectively—the direct influence of heredity is comparatively small, and is, at any rate, considerably less than has been generally believed.

If this contention is accepted, I shall have the satisfaction of having done something toward removing one great argument against the practical utility and probability of success in prophylactic measures directed against tuberculosis. Once let a parent recognize that it is by *infection* and not by *inheritance* that he may be a danger to his children, and it will not be difficult to persuade him to take precautions against spreading the disease. Thus, prophylactic measures will be easily introduced into the household where sanitary inspectors cannot penetrate.

[1] In over seven sex not given.

OTITIC EPIDURAL ABSCESS IN THE MIDDLE CRANIAL FOSSA ASSOCIATED WITH ABSCESS OF THE TEMPORAL LOBE OF THE BRAIN.

By Charles H. Burnett, M.D.,
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On June 30, 1897, I was asked by Dr. H. R. Wharton, one of the surgeons of the Presbyterian Hospital, to see with him a man, G. J. S., aged thirty years, who had been admitted to the hospital the previous night, where he had been brought in a semi-comatose condition, with a temperature of 99° F. We found him in bed, without any pain, but in a dazed condition of mind. He seemed to understand our questions, but was unable to give answers to them. If asked how he felt, he would shake his head affirmatively, and if we said "better?" he would then say, in a low tone, "better." When asked to put out his tongue, he would simply open his mouth, but could not protrude his tongue.[1] His tongue and teeth were covered with brownish sordes. His appetite was fair, his digestion good, and his bowels not constipated.

We learned from his wife that he had had a chronic purulent discharge from his left ear since childhood, and that he had been in the habit of picking at it with pins, etc., in order to cleanse it and free it from odor. On June 20th, ten days previous to admission, he complained of earache and toothache on the left side, and had had a tooth drawn to obtain relief from pain. The earache and discomfort in that region continued, however, and on June 23d, he came home from his work (that of a hall-man in a club) complaining of pain in his left ear, headache, and nausea, and finally he vomited and then went to bed, because too ill and weak to be up. His family physician was called in, and at first prescribed for a cold. By June 27th the patient felt better, and in the afternoon he sat up in bed an hour, between three and four o'clock. About 5 P.M., the same day, he became suddenly unconscious while lying in bed, and remained so until, at 7 P.M., he had a heavy, general convulsion, and at 9 P.M. he had another convulsion, but a less severe one. From this time until brought to the hospital in the evening of June 29th, he remained semi-comatose and paraphasic.

When examined by Drs. Wharton and Burnett on June 30th, at 11 A.M., the patient complained of nothing, and looked entirely comfortable. He was markedly paraphasic, and was not fully conscious of all that was going on around him.

There was no redness, tenderness, nor swelling anywhere about the ear or cranium, and there was *no* discharge from the ear. Inspection of the auditory canal revealed a large granulation at the meatus. This was removed with forceps, and the further inspection of the ear showed a loss of the membrana tympani, a red and sensitive promontory, a large, flabby granulation protruding from the tympanic antrum into the auditory canal, and a large perforation into the attic. These last-named cavities felt carious, but were entirely dry.

[1] Dr. Sinkler informs me that he has seen such inability to protrude the tongue in connection with tumor in the temporal lobe.

The carious condition of the attic, aditus, and antrum, the previous history of chronic otorrhœa, the recent attacks of pain in the ear, with convulsions a few days previous to admission, and the marked sensory aphasia of the patient, inclined us to make a diagnosis of a purulent focus of otic origin in the middle fossa of the cranium over the tegmen tympani, involving the temporal lobe and speech-centres, although the patient had had no subnormal temperature nor pulse, and he did not complain now of headache. His bowels, furthermore, were not constipated, his breath was not offensive, and his digestion was good. His pupillary reaction was normal; his eye-ground was examined at no time, as he could not sit up.

It was decided to explore the middle-ear cavities by way of the mastoid, in order to gain an idea of the pathway of infection to the brain.

This was done by Dr. Burnett in the usual way: the antrum, aditus, and attic were thrown into one cavity, but the mastoid cells, which were found to be normal, were not touched beyond removal of the cortex to reveal their condition. No pus was found in any of these spaces; only crumbling bone and two or three granulations, which were removed from the antrum. No communication through the tegmen tympani with the cranial cavity could be found. It was then decided to trephine the squama and explore the temporal region, as the otitic inflammation had apparently passed in that direction. Accordingly a one-inch crown trephine was placed by Dr. Wharton directly above the external auditory meatus, so that its lower edge was about an inch above this opening. Upon removal of the button of bone, the brain was felt to pulsate, and the dura was seen to be a little reddened near the anterior edge of the trephine opening. A bent grooved director was now passed by Dr. Wharton between the dura and the bone, toward the tegmen tympani, and about two fluidrachms of offensive pus were quickly liberated. Subsequent developments have shown us that it would have been well, in addition to this interference, to have explored the brain tissue of the temporal lobe at this time, after the manner of some of the Germans, to see if there might be a cerebral abscess simultaneous with the epidural collection of pus.

The wounds behind and above the ear were cleansed, drained, and stitched. The patient recovered from the ether very well and quickly, the operation having lasted over an hour. The temperature before the operation was 98.6° F. at 8 A.M., and after the operation (2 P.M) it was 105° F.; but after that it fluctuated, though on the whole it showed a downward tendency for seven days, until from 100.2° F. it went up in twenty-four hours to 104.2° F. The sensory aphasia increased, though the patient's cerebration was a little better. The day the temperature reached 104.2° F. at 8 A.M., the temperature at 12 M. was 101.8° F., when the patient vomited. At 8 P.M. the same day he had a chill. On the next day, July 9th, the patient had another chill at noon, his temperature being 102.4° F. By July 10th the man's speech was quite incoherent and unintelligible, though his efforts to speak were voluntary. His cerebration was now very poor, but he complained of no pain anywhere. His general sensibility was perfect, as he would drive the flies from his face and hands. He was restless at night, especially in the right leg and arm, he slept poorly, and yet at times, even during the day, his breathing was almost stertorous.

It was now thought by Dr. Burnett that the middle fossa of the skull

might not be sufficiently drained, and, therefore, it was decided to make a communication between the site of the epidural abscess and the drum-cavity through the carious tegmen tympani, which was done by Drs. Wharton and Burnett by cutting away the bone between the lower edge of the trephine opening in the squama and the tegmen, in the line of the upper wall of the auditory canal. When the tegmen was reached it was cut through with slender bone-forceps. No pus, however, escaped, and there was but slight bleeding. After the second operation the temperature tended upward and the aphasia increased, becoming complete, the mentality grew very dull, and by July 12th the right arm and leg became entirely paretic. There was also conjugate deviation of the eyes toward the left—the diseased side. Pupillary reaction was normal throughout our observation of the case in both eyes.

By July 13th it became very evident that there must be a collection of pus in the brain substance, most probably in the left temporal lobe. It was, therefore, decided to make an exploratory puncture of that region, which was done by Dr. Wharton, without ether, by means of a grooved director passed directly inward about one and a half inches, after the lower edge of the squamal flap had been turned back and the dura nicked open with the point of a knife, just enough to admit the director. Immediately about one-half fluidounce of thick, greenish, offensive pus escaped. The wound was then cleansed and a rubber drainage-tube inserted into the pus-cavity in the brain. None of this manipulation was perceived by the comatose patient, excepting the removal of a stitch from the skin-flap. The patient, however, did not recover consciousness; the paresis of the right side continued, but the conjugate deviation of the eyes disappeared. Pus continued to come from the brain, through the drain. But the temperature began to go up; there were involuntary discharges of urine; stupor was succeeded by profound coma, and the patient died without convulsions, with a temperature of 106.4° F., on July 15th, at 1 P.M. No post-mortem examination could be obtained.

The oscillations in the patient's temperature at 8 A.M. and 8 P.M., from June 30th to July 15th, are herewith appended:

	8 A.M.	8 P.M.
June 30	98.6° F.	100.8° F.
July 1	101.8	101.8
" 2	103.2	102.2
" 3	103.2	102.0
" 4	101.4	100.0
" 5	99.6	99.0
" 6	102.4	101.2
" 7	100.2	101.2
" 8	104.2	101.6
" 9	102.0	104.4
" 10	97.6	104.2
" 11	102.2	101.2
" 12	100.8	99.8
" 13	98.4	102.6
" 14	101.2	104.0
" 15	105.0	106.4 at 1 P.M. (death).

At no time during our observation of this case was there any complaint of any form of suffering made by the patient. The only symptoms of pressure from abscess in the temporal region were the sensory aphasia at first, and then the paresis on the side opposite to the diseased ear. The fluctuating temperature, with the continued frequent pulse and respirations, would indicate a pyæmic condition rather than the presence of a brain-abscess. But there were no signs of phlebitis nor thrombosis of the sinuses and jugular, and we knew the necrosis of the tympanic cavity had not advanced in the direction of the sigmoid groove, but had progressed in the direction of the attic.

The patient continued to present symptoms of pressure within the brain, notwithstanding the pus liberated, until, with a very high temperature, death supervened upon profound coma.

It becomes plain now that the epidural collection of pus in the middle cranial fossa could not account for the aphasic symptoms in this case, and, although where pus is found outside the intact dura one hesitates to puncture it for exploration of deeper parts, we now know it would have been better, with the aphasic symptoms in mind, to puncture the dura and brain at the time of the first operation, for doubtless we should have found pus in the latter. In fact, this method has been pursued with entire success when epidural pus has been met in the presence of symptoms of abscess in the temporal lobe.[1] The pyæmic pulse, respiration, and fluctuating body-temperatures, all existing in this instance, would naturally lead one to infer thrombo-phlebitis of the sinuses on the left side. But there were no symptoms to indicate such a condition, excepting the temperature oscillations. It is, however, very unusual to find such temperature fluctuations associated simply with cerebral abscess.

THE RÖNTGEN RAYS IN OPHTHALMIC SURGERY.

By Howard F. Hansell, A.M., M.D.,
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The discovery of Röntgen, that the soft tissues of the body were transparent to certain rays emitted from a vacuum-tube when electrically stimulated, and its practical application to the uses of medicine and surgery, mark a distinct epoch in the history of science. Experiments conducted by scientists over the world immediately confirmed the announcement of the mystic properties of the Röntgen or x-rays, and during the eighteen months that have passed continued experimenta-

[1] Case by Dr. J. E. H. Nichols, Manhattan Eye and Ear Hospital Reports, January, 1897.

tion has increased their applicability, widened their field of usefulness, and defined in part their capabilities and limitations, and has given us every reason to believe that further research, with improved apparatus and with a more profound knowledge of their intimate nature, will lead to still greater achievements. We may hope, for example, by varying intensities of energy, or diminished duration of exposure, or modification of the vacuum-tubes, to inspect, with some degree of clearness, the contents of organs of which we now barely see the outlines, to differentiate diseased from normal structures, and to give to the x-rays the prominent place in medicine that they now occupy in surgery.

The attention of ophthalmologists was practically drawn to the utilization of the Röntgen process in ophthalmic surgery in the detection of foreign bodies, such as glass and fragments of metal, in the interior of the eyeball, by the papers of Clark and Williams,[1] which announced for the first time that the coats of the ball are penetrable by the rays, and that the presence of foreign bodies can be diagnosticated by their shadows cast on negatives and developed by the ordinary photographic processes. In Clark's case, the metal, the presence of which had hitherto been extremely uncertain, was discovered to be behind the iris near the corneo-scleral angle. It was extracted by the Hirschberg magnet, and the patient recovered almost the full acuity of vision. The method of operating the apparatus was original and novel. A photographic film encased in waterproof covering was inserted into the nostril of the same side as the injured eye until its upper extremity lay in contact with the cribriform plate of the ethmoid bone. The Crookes tube was stationed in front and to the same side of the head, about thirteen inches distant from the eye. The rays passed through the envelopes of the eye, the nasal bone, the nasal process of the superior maxillary bone, and the soft tissues, casting well-defined shadows of the bony parts and of the piece of metal. The diagnosis and cure were effected by the one force under widely different manifestations. Williams' result in determining the applicability of the rays to the diagnosis was equally satisfactory, but unfortunately the severe accident destroyed both the sight and the ball. The patient was laid on his side on a table with the temple resting upon the glass plate and the tube held obliquely thirteen inches above and in front of the face. The rays pierced the eye, its adjacent soft tissues, and the bones of the external wall of the orbit, the last casting its clearly outlined shadow together with that of the foreign body, both readily distinguishable from other shadows on the plate. The history of the injury showed that the offending substance was copper, therefore the use of the magnet was precluded. The eye was enucleated and the diagnosis proved. It is interesting to observe that the different

[1] Transactions of the American Ophthalmological Society, July, 1896.

methods of experimentation resorted to in these two cases demonstrate, respectively, that the nasal and temporal walls of the orbit offer no practical obstacle to the applicability of the Röntgen process in ophthalmic surgery, and that both the results disprove the statement that the ocular envelopes themselves cast shadows so dense that that of a fragment of metal would be concealed.[1]

The good work inaugurated in Columbus and Boston has been continued in Philadelphia with uniformly successful result. The labors of Stern in the Polyclinic, of Goodspeed and Leonard in the University, and of Sweet in the private laboratory of Queen & Co. have met with pronounced success. To the first-named gentleman I am indebted for the excellent skiagraphs of the two cases reported below. After repeated experiments according to the suggestions of Clark and Williams, Dr. Stern succeeded—by the simple method of bandaging the sensitive plate to the temple on the side of the wounded eye, allowing the patient to sit upright, and suspending the tube in front of and to the opposite side at the angle of 45 degrees with the optic axis, and fourteen inches distant—in obtaining pictures that showed beyond question the existence of foreign bodies within the ball.

These are the first two successful cases in Philadelphia, and demonstrate the claim previously made, that the x-rays are a useful adjunct to the diagnostic resources of the ophthalmic surgeon.

During the past winter, with the kind co-operation of Dr. Stern, I made a number of efforts to determine whether the rays had a beneficent or injurious action upon diseased and healthy eyes. It was found, in cases of opacity of the media, such as leucomatous corneæ, capsular and lenticular cataract, that no improvement whatever could be noted either in the disease or in the ability of the patients to see clearer through the fluoroscope than without it. In a case of nearly absolute central scotoma due to a large patch of central retino-choroiditis, repeated exposure to the rays as they were emitted from the tube gave the same negative result. The findings in cases of atrophy of the optic nerve were equally discouraging. From these trials it was concluded that, as a means of treatment of diseases causing blindness, the rays were of no value. The only exception to this statement is recorded in the history of Case I., when the exposure had the unexpected effect of soothing pain and reducing inflammation; but whether this happy result was simply a coincidence or a real or psychic manifestation, cannot be asserted. Dr. Wilkinson, of the California School for the Blind, selected six pupils for testing, one with destruction of the anterior part of each eye from old traumatism, one with complicated congenital cataract, one with partial phthisis bulbi from ophthalmia neonatorum, and three with optic-

[1] AMERICAN JOURNAL OF THE MEDICAL SCIENCES, March, 1896.

nerve atrophy. In none did the rays assist the vision in the slightest degree. Beck,[1] in speaking of the possible curative effects of the rays in zymotic diseases, states that the vitality of pathogenic bacteria is not impaired even after exposure of several hours. As bearing upon the subject of the sedative action of the rays, mentioned as occurring in my first case, the report of their effect[2] on frogs is of interest. A frog was placed in a small wooden box toward which the rays were directed, while a control frog in a similar box was protected from the rays by a sheet of lead laid on top of the box. To each was administered 0.04 mgm. of strychnine; the first showed no trace of intoxication, while the second was found in tetanic convulsions. Beck's suggestion,[3] that persons blind from loss of transparency of the media might be able to read letters painted on a cardboard that were varnished and dusted with powdered metal, if they were subjected to the action of the x-rays, is impracticable unless a fluoroscope or some other impossible tungstate of calcium screen, by which shadows were rendered visible, be placed behind the opaque cornea or lens. Otherwise this source of illumination is no more avaliable than any other.

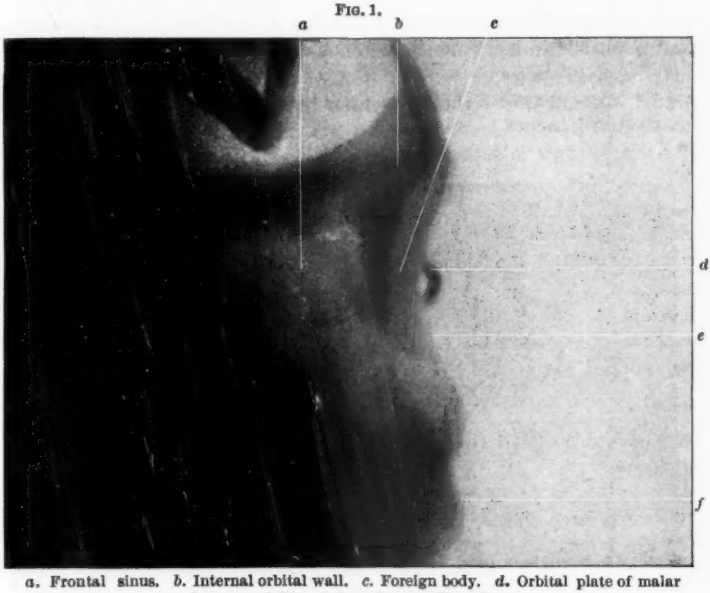
No cases of injury to the tissues of the eye from the action of the rays, even under the former prolonged exposures, have been published, and now with improved apparatus the danger of burning the skin or producing destruction of the hair-bulbs is insignificant.

CASE I.—R. G., machinist, twenty-five years of age, applied at the Out-Patient Department of the Jefferson Hospital in October, 1895, with the history of an injury to the left eye while breaking a cast-iron elbow with a hammer. The cornea presented a small, irregular cicatrix; the anterior capsule and the lens had commenced to become opaque; the iris was inflamed and adherent to the capsule, and vision was greatly reduced. No foreign substance could be seen in the imperfectly illuminated media or fundus. Under treatment the inflammation subsided, and no operation was resorted to. The man was requested to return frequently for inspection. No severe symptoms developed, although the eye was subject to attacks of irritation, until October, 1896, one year later, when iridocyclitis supervened. The patient was now subjected to the x-rays, and, after most creditable perseverance, Dr. Stern succeeded in obtaining a shadow picture that showed the presence of a piece of metal probably located in the anterior portion of the vitreous body. One of the exposures was made during an attack of iridocyclitis. The patient voluntarily stated that the pain, which had been severe, and had caused him sleepless nights, was promptly and entirely relieved, and it was observed that the marked injection was greatly reduced. After an unsuccessful attempt at extraction with the Hirschberg magnet the ball was enucleated. Upon section, a scale of iron, 2 mm. in length,

[1] Transactions of the Pan-American Congress, Mexico, 1896.
[2] St. Petersburg med. Wochenschr., No. 1, 1897.
[3] The Memorabilien, February, 1897.

½ mm. in width, was found firmly embedded in the ciliary body and surrounded by a mass of exudation. (Fig. 1.)

FIG. 1.



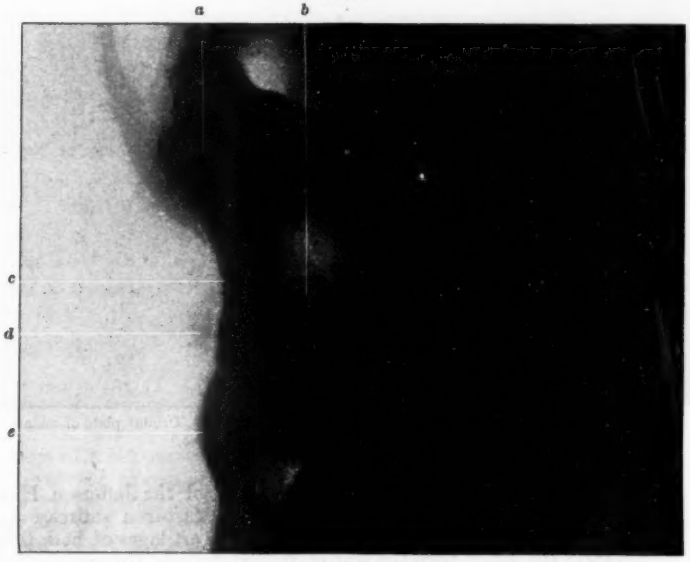
a. Frontal sinus. *b*. Internal orbital wall. *c*. Foreign body. *d*. Orbital plate of malar bone. *e*. Orbit. *f*. Superior maxillary bone.

CASE II.—F. N. was admitted into the wards of the Jefferson Hospital November 14, 1896. While chiselling a cast-iron staircase he received a wound in the left eye. The skin and cartilages of both lids, particularly the lower, were the seat of ragged wounds, the conjunctiva was cut, the cornea opened in its oblique diameter, the lens was missing, the iris protruded in part through the wound in the cornea, part of the vitreous was lost, and the anterior chamber contained blood. The edges of the wound in the lids were united by suture, the torn iris and protruding vitreous cut away, and the eye antiseptically dressed and bandaged. The patient asserted positively that the iron inflicting the injury was too large to be lodged within the ball, and from the extent of the superficial wounds I was inclined to concur in this opinion. After a week's vain effort to save the ball the x-rays were applied and the eye enucleated. No sections were made until after Dr. Stern's skiagraph showed positively the presence of a large piece of metal in the vitreous. Subsequently a fragment of cast iron, weighing 3 grains, of irregular shape, and with very sharp jagged edges, was found in the anterior part of the vitreous. (Fig. 2.)

Thus in two instances, in October and November respectively, skiagraphy demonstrated beyond question the presence and approximate

location of pieces of metal within the eyeball. In the one the condition had been assumed, in the other the earlier diagnosis had been proved incorrect. The next two cases reported in Philadelphia, by Ring and de Schweinitz, before the Ophthalmic Section of the College of Physicians, and published in its *Transactions*, January 19 and February 16, 1897, may be briefly referred to. In Ring's case a piece of steel had penetrated the vitreous eighteen months before. Two radiographs were

FIG. 2.



a. Frontal sinus. *b*. Orbit. *c*. Orbital plate of malar bone. *d*. Foreign body. *e*. Superior maxillary bone.

exhibited, each showing the presence and probable site of the foreign body. The Hirschberg magnet was powerless to dislodge it from its bed in the ciliary body, and the ball was enucleated. In the other case de Schweinitz succeeded in establishing the diagnosis by the rays, in extracting the metal after two futile attempts by other surgeons, and in restoring useful vision. The following case, the last of the series in Philadelphia to be published, was reported before the same section in February, 1897, by Dr. A. G. Thomson:

A small piece of steel had lodged in the posterior cortex of the lens of a young man. Because of the continued transparency of the lens some doubt was felt as to the nature of the foreign body. A series of skiagraphs, taken by Dr. William M. Sweet, demonstrated beyond question that the foreign substance was impenetrable to the rays. Dr.

William Thomson subsequently extracted the lens and with it the supposed metal.

Following Dr. Thomson in his detailed description of the treatment of the case, read before the American Ophthalmological Society, May, 1897, Sweet demonstrated his method of localizing foreign bodies in the eye, which has proved, both in this case and in others not yet published, accurate and of great value. Dr. C. A. Oliver reported at the same meeting the results of his own and Dr. Leonard's methods of localization based on practically the same principle as that described by Sweet.

It is evident, therefore, that the Röntgen process, even at this comparatively early stage of experimentation, when our knowledge of the rays is imperfect and immature, is an extremely valuable means of diagnosis in the surgery of the eye, and it is believed that continued investigation will not only confirm the claim and statements made in this paper, but will add to our conviction that in the x-rays we have an accurate, speedy, and reliable method of establishing the presence or absence of foreign bodies in the eyeball.

SEGMENTATION AND FRAGMENTATION OF THE MYOCARDIUM.[1]

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The muscular fibres of the mammalian heart were shown by Eberth[2] to be columns of short striated and nucleated cells or segments held together at the ends by a delicate cement. The cells have lateral processes that coalesce, by means of cement, with those of adjacent cells. Normally the layers of cement between the ends of the cells and their processes are not visible; on the addition of acetic acid the cement substance becomes quite plain, and with 30 per cent. solution of caustic potash the individual muscle-cells may be isolated (segments of Weissmann).

Of the morbid changes of the myocardium proper none occur more frequently or under a greater variety of circumstances than the lesion known as segmentation[3] and fragmentation of the muscle-fibres.

[1] Read before the Philadelphia Pathological Society, April 22, 1897.

[2] Die Elemente der Guergestreiften Muskeln, Virchow's Archiv, 1866, Bd. xxviii. p. 100.

[3] In biology segmentation means cell-cleavage; generally it means the act of dividing into the segments or parts into which any body naturally separates. It is in the latter sense that the word is used in connection with the lesions of the myocardium under discussion, and it means the separation of the muscle-fibres of the heart into the cells or segments of which they

While Virchow,[1] v. Zenker,[2] Rindfleisch,[3] and Coats[4] make incidental mention of transverse separation or fracture of the cardiac muscle-fibres, Renaut,[5] in association with Landouzy, in 1877, was the first to call direct attention to the dissociation of the muscle-cells. They showed that, as they believed, under the influence of general nutritive disturbances the intercellular cement softened and the individual cells were set free. They referred to this condition as "disintegration, dissociation, segmentation—*état segmentaire.*" This observation was followed by a number of clinical and anatomical studies of the subject by pupils of Renaut as well as by other French writers—Colrat,[6] Durand,[7] Chalot,[8] Weill,[9] Dejerine,[10] Duplaix,[11] Mollard.[12] Mention of the change was also soon made by various French systematic writers—Pitres,[13] Lancereaux,[14] Jaccard,[15] Paul,[16] Robin,[17]—and in 1890 Renaut[18] published an article in which he not only describes the anatomical changes, but also gives the clinical picture of the condition, which he dignifies as an independent disease. The principal symptoms are: Arhythmia, weakening of the impulse of the apex, some increase in the area of the heart's dulness, an uncertain systolic murmur, and, occasionally, œdema of the lower extremities. He attributes the dissociation of the cells to solution of the cement substance on account of senile involutionary changes, alcoholism, infection, and the associated high temperature. Individuals affected with such changes in the heart-muscle may perish on account of syncope or asystole, or from intercurrent diseases which, otherwise of little importance, assume a much more serious aspect on account of the existing heart-lesion.

are composed. "Fragmentation" signifies a breaking into irregular pieces. Both terms are applied to dissociation of the cardiac muscle fibres. In this paper they will be employed as consistently as possible.

[1] Ueber parenchymatöse Entzündung, Virch. Arch., Bd. iv. p. 266.

[2] Ueber die Veränderungen der willkürlichen Muskeln in Typhus Abdominalis, 1864.

[3] Lehrbuch der pathologischen Gewebelehre, 1870, p. 202; 4th ed., p. 239.

[4] Two Cases of Calcareous Infiltration of the Muscular Fibres of the Heart, Glasgow Medical Journal, 1872.

[5] Note sur les alterations du myocarde accompagnant l'inertie cardiaque, Société de Biologie, July 7, 1877.

[6] Contribution a l'étude des myocardites chroniques et la désintegration cardiaque, Lyon Méd., 1879.

[7] Etude anatomique sur le segment cellulaire cardiaque, Thèse de Lyon, 1879.

[8] Essai sur la désintegration de la fibre musculaire, Thèse de Paris, 1880.

[9] De la mort subite dans la pleurésie, Revue de Médecine, 1887, No. 1.

[10] Sur les altérations du myocarde come cause de mort subite dans le fièvre typhoide, Soc. de Biol., Dec. 26, 1885.

[11] Contribution a l'étude de la sclerose, Arch. Gén. de Médecine, 1885, 7 série, p. 145.

[12] De la myocardite sigmentaire essentielle et principalement de la forme senile de cette affection, Thèse de Lyon, 1889.

[13] Des hypertrophies et des dilatations cardiaques indépendantes des lésions valvulaires, 1878.

[14] Traité d'anat. path., 1881, p. 799.

[15] Traité de path. interne, 1883.

[16] Maladies du coeur, 1883, p. 468.

[17] Leçons de clinique et thérapeutique médicale, 1877, 20 ième leçon.

[18] Gazette des Hôpitaux, 1890, p. 202.

In 1888 Przewoski and Klein[1] described some cases of very sudden death which were attributed to extensive myocardial segmentation. The following year Browicz[2] published a study of segmentation based on the careful examination of forty-two cases. This is the first publication on the subject in the German language. He concludes that segmentation is due to changes in the cement substance, occurs ante mortem, and may cause cardiac insufficiency and arrest of the heart's action.

In the discussion upon the disturbances of the myocardium at the Tenth International Medical Congress in Berlin, in 1890, v. Recklinghausen[3] states that microscopic appearances and the frequent connection of dissociation with sudden or rapid, spontaneous death lead him to regard this change in the cardiac fibres as the result of excessive stimulation and irregular contraction of their substance, which passes directly into rigor mortis, and is accompanied with a separation into segments as well as a breaking into fragments. There is, therefore, no ground for believing, as Renaut does, that the primary change is in the cement substance. The frequent association of these changes with the various pathological conditions included under the term myocarditis shows that these conditions, on account of changes in the muscular tissue or in the heart's activity, predispose the fibres to dissociation.

v. Zenker[4] agrees as to the agonal character of actual dissociation. It would be impossible for cardiac contractions to continue after a general disintegration in this manner of the muscle-fibres; but it is equally evident that a heart whose fibres undergo agonal dissociation must have been the seat of intravital, physical, and chemical changes that gave rise to the weakness and final arrest. The *état segmentaire* is, therefore, an anatomical change that explains to a certain extent many deaths from "heart-failure" (*Herzschlag*).

Marchand[5] (Marburg) in the same discussion questions the statement that the fragments always correspond to the heart muscle-cells, and suggests that possibly the lines of separation represent, as assumed by Wagner, irregular lines of contraction along which separation later on occurs.

Tedeschi[6] found that in two hundred and thirty-six deaths from various causes segmentation was present in 48 per cent. The frequency of dissociation in infectious diseases and in acute and chronic diseases of the central nervous system lead this author to believe that physical changes in the cement, due to toxic substances or to nutritive disturbances, are the essential causes of the process.

[1] Gazeta lekarska, 1888, No. 18.

[2] Ueber das Verhalten der Muskelzellbalken des Herzens in path. Zuständen, Wiener kl. Wochenschrift, 1890, No. 80.

[3] Verhandlungen des X Intern. med. Congress, Berlin, 1890, Bd. II. Abth. 8.

[4] Loc. cit.

[5] Loc. cit.

[6] Ueber die Fragmentatio des Myocardium, Virch. Arch., 1892, Bd. cxxviii. p. 185.

Israel[1] made the important observation that in districts of separation there is a marked loosening in the secondary bundles, due apparently to stretching of the intermuscular connective tissue—a change that would point to the action of mechanical influences. Not being able to produce any changes by means of mechanical overdilatation or stretching of dead hearts, he assumes the constant presence of some deviation from the normal in the primitive bundles of disunited hearts, such as pigment atrophy, parenchymatous changes, and fatty degeneration. Under such conditions he is inclined to conclude that any increase in the work placed upon the heart may lead to separation.

Oestreich,[2] in 1894, reviewed dissociation or fragmentation with reference to the anatomical changes, to its relation to the cement, and to its importance as regards the heart's work. He came to the conclusion that it concerns not so much separation of the muscle-fibres into muscle-cells by a solution of the cement, as spoken of by the previous authors, but that fragmentation is essentially, as this term would imply, multiple fractures or tears of muscle-fibres, the lines of which oftener pass through the muscle-cells than along the cement substance. Longitudinal ruptures were also occasionally seen. Such being the case, and fragmentation occurring very often in otherwise normal hearts in persons dying suddenly, rapidly, or slowly from known causes, he concludes that it is caused by irregular contractions during the death agony, and may occur in connection with practically all diseases and modes of death.

L. Bard[3] regards the *état segmentaire* of Renaut as fragmentation or rupture of the fibres rather than a segmentary dissociation. These ruptures are probably of post-mortem origin, due to reagents and diverse manipulations; yet they are not artefacts, because the real condition is an excessive fragility on account of secondary nutritive troubles. It is, therefore, a subordinate lesion, found in grave acute diseases and in asystolic hearts, that cannot be promoted to the rank of a special primary process.

Renaut,[4] at the first French Congress of Medicine, in 1894, again reviews the subject of segmentary dissociation of the myocardium, and essays to prove, in contradiction to v. Recklinghausen,[5] Oestreich,[6] and others, that it concerns an undoubtedly vital and not merely agonal lesion; that segmentation and fragmentation are part and parcel of a complex and progressive, definite, morbid process, the seat of which is in the muscle-cells. This process is characterized anatomically by great swelling or gigantism of the nuclei of the muscle-cells, by a marked increase

[1] Zur Entstehung der Fragmentatio Myocardii, Virch. Arch., 1893, Bd. cxxxiii. p. 551.
[2] Die Fragmentatio Myocardii, Virch. Arch., 1894, Bd. cxxxv. p. 79.
[3] De la signification anatomique et clinique des diverses lésions du myocard, Congrès Français de Médecine (1894), Paris, 1895, p. 806.
[4] Sur la dissociation segmentaire du myocarde, Congrès Français, etc., 1895.
[5] Loc. cit. [6] Loc. cit.

of the intercontractile plasma of the cells, which causes an atrophy of the fibrillæ—"hyperplasmic atrophy"—making the fibres perhaps brittle, and thus predisposing to fragmentation; and, finally, by softening and liquefaction of the intercellular cement, which allows segmentation to take place. This dystrophy, of whatever cause it may be, leads sooner or later to cardiac asthenia, and Renaut claims that senile cardiac insufficiency due to this pathological process is susceptible of clinical diagnosis.

American medical literature is silent upon the subject of myocardial dissociation. The scattered remarks on the subject in the *Twentieth Century Practice* contain historically erroneous statements that deprive Renaut of his due credit as the one to whom we owe our knowledge of the lesion.

The essential basis for the present consideration of this form or forms of disturbance in the myocardium rests partly upon a study of the literature bearing on the subject, but essentially upon the results obtained from investigation of a large number of hearts from animals and human beings dying from a variety of causes and under diverse circumstances.

ARTIFICIAL SEGMENTATION. The authors are now practically agreed that segmentary dissociation is not of post-mortem origin, neither is it an artefact. v. Recklinghausen,[1] Renaut,[2] and others have found well-marked segmentation in hearts from bodies—especially of executed individuals—that were examined immediately after death. I have found it present in bodies examined within one hour after death.

Histologists are well aware, especially since Eberth's[3] work, that certain reagents, such as solutions of acetic acid, have to be applied to render the cement substance visible; and, furthermore, that 30 or 40 per cent. solutions of KOH dissolve the cement and set the muscle-cells free.

Tedeschi[4] found that the fixing and staining fluids ordinarily in use do not produce misleading artefacts. Flemming's solution only seemed to render the cement substance visible, and should consequently not be used in studying the heart-muscle in regard to the presence of segmentation.

While segmentation was looked upon as a cadaveric change by O. Israel,[5] in 1889, he freely denies all influence of artificial and post-mortem factors in its production in 1893.[6]

Rindfleisch claims to have produced mechanical disintegration by overdistention of a dead rabbit's heart, but neither Israel[7] nor Browicz[8] could produce segmentation by mechanical overdilatation and stretching

[1] Loc. cit. [2] Loc. cit. [3] Loc. cit. [4] Loc. cit.
[5] Praktikum der path. Histologie, 1889, p. 255. [6] Loc. cit. [7] Loc. cit.
[8] Ueber d. Bedutlung d. Veränderungen der Kittsubstanz der Muskelzellbalken des Herzens, Virch. Arch., Bd. cxxxiv. p. 1.

of dead hearts. Israel[1] found that forcible overdilatation of tetanized hearts did not produce dissociation.

While decomposition under ordinary circumstances (Browicz,[2] Tedeschi[3]) does not cause dissociation, Dunin[4] found that artificial gastric juice as well as decomposition under water may cause separation of the cells. He, therefore, regards chemical changes in the organism as the essential cause of dissociation, while mechanical conditions might produce ruptures of the muscle-cells themselves. He expresses the opinion that possibly the agonal invasion of the bacterium coli commune may cause chemical solution of the cement substance.

A number of human hearts were allowed to decompose in a moist atmosphere, at room temperature as well as in the ice-box; but it so happened that none of them, examined at irregular intervals up to ten days after removal from the body, showed any separation of the fibres. Pieces from healthy human hearts were also allowed to decompose under water as well as to remain for from twenty-four to forty-eight hours in bouillon cultures of colon bacilli; but the fibres did not become disunited, not even in the vicinity of the bacterial colonies in the interior of the pieces. Similar results were obtained with animal hearts. In this respect my observations differ from those reported by Dunin.

Animal as well as human hearts were examined before and after rigor mortis, but no difference in the structure of the muscle-fibre was observed. Hearts were allowed to freeze stiff, but segmentation did not occur. The view expressed by Rosenbach,[5] that the fall of the temperature of the body after death leads to dissociation, did not receive support.

It may, therefore, be concluded that true segmentation, as ordinarily observed, is not an artefact or post-mortem change. In reality there is all reason to believe that no artificial separation of the cells can, under any circumstances, present such microscopic pictures as the sections of hardened specimens of hearts the seat of typical dissociation (Fig. 5). On the other hand, it cannot be denied that various reagents and manipulations may produce ruptures of the muscle-fibres, especially if the latter are brittle on account of degenerative changes. Thus, pressure on the cover-glass may be sufficient to produce breaks in underlying fibres in teased and unimbedded specimens.

Experimental Segmentation and Segmentation in Animals. Tedeschi[6] instituted an extensive series of experiments; but infections, injuries to the brain, traumatic sudden death, overstimulation, etc., failed to produce dissociation in mice, guinea-pigs, rabbits, cats, and dogs. Cutting of the vagus produced indications of segmentation in

[1] Loc. cit. [2] Loc. cit. [3] Loc. cit.
[4] Einige Bemerkungen über der Fragmentation der Herzmuskelzellen, Ziegler's Beiträge, 1894, Bd. xvi.
[5] Die Krankheiten des Herzens und ihre Behandlung, p. 666. [6] Loc. cit.

circumscribed districts. Some segmentation also occurred around wounds made with red-hot needles.

Oestreich,[1] having observed segmentation in persons that died from or in chloroform narcosis, tried in vain to produce this change by killing animals (four dogs and one rabbit) by administration of chloroform.

Charrin[2] showed that among the extensive changes in the myocardium following the injection of the sterile products of the bacillus pyocyaneus are necrotic areas, in the centre of which there may be segmentation of the fibres.

J. Mollard and Cl. Regnaud[3] found that in dogs that die from diphtheria intoxication sinuous lines corresponding to the points of contact of the muscle-cells at times become visible, and that occasional segmentation may take place. Fractures of the fibres were also present.

I have examined a large number of hearts from dogs, cats, chickens, rabbits, guinea-pigs, mice, and rats that died from various infections or were killed in the course of ordinary laboratory experiments (here is included a number of animals that died from experimental air embolism). The results were practically negative as regards segmentation. Only in one guinea-pig that died from diphtheria intoxication did the heart present distinctly visible transverse cement lines.

The fresh hearts were obtained from six hogs, six sheep, and six young cattle butchered at the stock-yards. Segmentation was not present in a single heart; not even were the cement lines visible. All the hearts were firm and healthy.

A thorough histological study was also made of the different portions of ten horse hearts. The hearts were obtained from old and useless horses that were killed for the products obtainable from their bodies. In almost all these hearts the cement substance was quite distinct, in the form of transverse, quite straight, more or less prominent lines; but typical segmentation was not observed in a single instance. The pigment was very plain in some of these specimens.

Through the courtesy of Dr. A. H. Baker, of the Chicago Veterinary College, I obtained the heart of a horse that died of enteritis and the heart of one dying from influenza, pneumonia, and exudative pleurisy. Both these hearts were the seat of well-marked parenchymatous degeneration, the consistence being rather soft and the cut surface presenting a yellowish-gray, opaque appearance, and the sections showed some separation of the muscular fibres in the right as well as in the left ventricle, but this separation seemed to be due more to a rupture of the fibres than to solution of the cement, because the margins of the fragments were very ragged.

[1] Loc. cit. [2] Verh. d. X. Intern. Med. Congresses, 1890, Bd. ii. Abth. 2.
[3] Lésions du myocarde dans l'intoxication aigue par la toxine diphthérique, Annales d. l'institut Pasteur, 1897, t. ii. p. 97.

It is consequently probable that in the hearts of diseased larger animals segmentation and fragmentation also occur, although perhaps not to such an extent as these changes are observed in man. It would seem that, on the whole, human heart-muscle is especially prone to dissociation as compared with the heart-muscle of animals.

Segmentation and Fragmentation in Man. The hearts from more than two hundred persons dying from all sorts of causes have been studied as regards segmentation and allied changes. Many of these hearts were obtained through the courtesy of Dr. Louis J. Mitchell, physician to the Coroner's office of Cook County, and I wish to thank Dr. Mitchell for his great kindness in this matter, especially because he made it possible for me to examine the hearts from those dying suddenly from both natural as well as traumatic causes. I also wish to thank Prof. J. B. Herrick and Dr. Noel for aid in obtaining suitable hearts. The large majority of the specimens came from the dead-house of the Cook County Hospital.

As far as possible accurate observations were made in regard to the time of examination after death, to the degree of contraction and of fulness of the different cavities of the heart, and especially as to the looseness or firmness of texture of the heart's flesh, in order to obtain, if possible, any data that would warrant the formation of an opinion as to the presence of segmentation from the mere naked-eye inspection. In the majority of the cases teased preparations from the left papillary muscles and from the ventricular septum were made in physiological salt solution and mounted in glycerine. Taking the statements of Tedeschi and Oestreich for granted, namely, that if fragmentation is present at all in a heart, it will be found first in the left papillary muscles and then in the septum, it was concluded that if the teased specimens failed to demonstrate segmentation, then no further examination of such hearts would be made except to harden, embed, and make stained sections from the two places mentioned, in order to control the correctness of the conclusion based on the examination of the teased preparations. It was found that practically, without any exception, the study of carefully and gently made teased specimens will demonstrate satisfactorily the presence or absence of general segmentation. Small pieces in which the fibres run parallel with each other should be used and carefully dissociated by means of fine, clean needles. Teased specimens are hardly sufficient, however, to demonstrate the absence or presence of focal segmentation, because the routine histological examination of a number of specimens in which teasing had not revealed any changes showed frequent foci of segmentation. Whenever the teased specimens showed fragmentation, suitable pieces were cut out from the different parts of the hearts and hardened in 5 per cent. solution of formalin, in alcohol, or in Müller's fluid, embedded in celloidin or paraffin, and stained

(after fixation on the slide in the case of paraffin specimens), mostly with hæmatoxylin and eosin. A few fatty degenerated hearts were fixed in Flemming's solution and stained with safranin. I can confirm Tedeschi's statement that none of the ordinary histological methods give rise to misleading artefacts. Like Tedeschi, I also observed that the intercellular cement becomes markedly prominent in preparations fixed in Flemming's solution; but inasmuch as it concerned mostly fatty hearts, usually with some real dissociation, I cannot say how much of the apparent change was real and how much artificial.

In the table showing the percentages I have included under the heading "Segmentation and Fragmentation," in addition to the typical cases, all the instances in which the intercellular substance was plainly visible in the teased specimens, because this change is undoubtedly closely related to actual segmentation, and also all cases of more or less well-marked fragmentation in which it seemed reasonable to believe that the change was not wholly an artefact.

TABLE SHOWING THE RELATIONS OF MYOCARDIAL DISUNION TO SEX AND AGE IN 190 CASES.

Decimal periods.	Normal.		Segmentation and fragmentation.		Percentage of disunion.	
	Female.	Male.	Female.	Male.	Female.	Male.
I.	5	9	1	0	16.66	0
II.	2	4	0	4	0	50
III.	4	9	8	22	66.66	70.96
IV.	3	14	9	19	75	57.57
V.	1	5	7	25	87.50	83.33
VI.	3	1	1	17	25	94.44
VII.	2	3	3	9	60	75
Total	20	45	29	96	59.18	68.08

Total number of cases 190
Disunion in . . . . . 65.78 per ct.

THE FREQUENCY OF SEGMENTATION AND ITS RELATION TO OTHER DISEASES. (*a*) *General Frequency.* v. Recklinghausen[1] found segmentation present in all cases of spontaneous sudden death occurring in the course of chronic myocarditis, coronary sclerosis, or changes at the root of the aorta; in many acute infectious diseases; in cases of sudden death in nephritis with cardiac hypertrophy, but without cerebral hemor-

[1] Loc. cit.

rhage; in rapid death from cerebral hemorrhage; and, finally, in many cases of sudden death due to traumatism and other causes. He did not find it in influenza or acute articular rheumatism.

Tedeschi[1] gives the following statistics: In two hundred and thirty-six cases of death from various diseases he observed segmentation or fragmentation in 48 per cent. (in the men 44 per cent., in the women 53 per cent.); twenty-three cases, from one to ten years old, gave 9 per cent.; twenty cases, from eleven to twenty, gave 50 per cent. (43 per cent. in the male and 66 per cent. in the female); fifty-seven cases, from twenty-one to thirty, gave 48 per cent. (43 per cent. in the male and 53 per cent. in the female); forty-eight cases, from thirty-one to forty, gave 54 per cent. (61 per cent. in the male and 45 per cent. in the female); thirty-one cases, from forty-one to fifty, gave 62 per cent. (44 per cent. in the male and 86 per cent. in the female); thirty-one cases, from fifty-one to sixty, gave 40 per cent. (equal in both sexes); fourteen cases, from sixty-one to seventy, gave 80 per cent. for men and 100 per cent. for women; after seventy-six years, 50 per cent. for men and 33 per cent. for both sexes. As regards diseases, severe general infections in adults were accompanied with this lesion in 82 per cent.; deaths after severe operations in 100 per cent. (ten cases); cerebral diseases in adults in 92 per cent; heart-diseases in 50 per cent. of the cases.

Oestreich,[2] without presenting any figures, says that, after extended observations, it would be practically impossible to name a disease in connection with which he had not observed fragmentation—it may occur in every disease.

In one hundred and ninety consecutive cases that I have examined segmentation and fragmentation in the broadest sense occurred in 65.78 per cent. Except in the first, and, to a less extent, in the second, decennium, this lesion is certainly present in the majority of the cases that die from the ordinary causes under familiar circumstances. In about one-half of the cases it concerned a marked general dissociation.

In the first decennium the only instance in fourteen cases occurred in an eighteen-months-old girl that died from acute nephritis and bronchopneumonia. The cement substance was clearly visible, and there were a number of ruptured fibres. The other cases examined include a wide range of pathological conditions.

In the second decennium there were four instances of focal or slight segmentation in ten cases. Two were quick deaths from traumatic causes (crushing injury and bullet-wound of chest), one died from gas-asphyxia, one after a bullet-wound of the spleen, and all were free from any important chronic diseases.

(*b*) *Relation of Segmentation to Infections.* A general bacteriological

[1] Loc. cit.

[2] Loc. cit.

examination was made in forty-nine cases. In fifteen the organs and the heart's blood were sterile; in thirty-four the commoner forms of bacteria (the colon bacterium, the pyogenic cocci, the micrococcus lanceolatus, the typhoid bacillus) were found more or less widely distributed. Segmentation and fragmentation were present in twenty of these cases and absent in fourteen. Without entering into details it may be said that any inseparable relation between any single micro-organism and segmentation in general, or at any particular period of life, could not be demonstrated from this small number. Thus, the colon bacillus was present in eight instances, four of which were cases of peritonitis; in three of the eight segmentation was present; the youngest of the five in which it was absent died at fifteen, the oldest at forty-five, both of peritonitis. In ten cases it concerned fatal infection with the micrococcus lanceolatus in the form of an anatomically typical lobar pneumonia frequently associated with endocarditis, pericarditis, and meningitis. In all these cases, the ages of which varied from twenty-three to sixty years, the heart was hypertrophied, weighing from 380 to 730 grammes, arterio-sclerosis being present in some of the hearts. Segmentation was present in nine. In eight cases of typical fibrinous pneumonia, but without bacteriological examination, disunion was observed five times.

In eleven cases in which the blood and the organs were sterile, dissociation was observed in five, including sarcomatosis, puerperal eclampsia, constitutional syphilis with interstitial nephritis, and glioma of the brain.

In two cases in particular there were found enormous numbers of rather long bacilli in the generally segmented heart-muscle, scattered between the sides and ends of the segments (Fig. 7). One was killed directly by a wagon passing over the abdomen, the other died instantaneously from the rupture of an aortic aneurism. This was, therefore, undoubtedly a post mortem bacillary invasion; and the possibility that the bacilli may have dissolved the cement substance cannot be wholly denied, although it must be remembered that segmentation is observed in cases of sudden traumatic death examined at once. It is evident, however, that the vital, agonal, or post-mortem action of bacteria upon the heart-muscle cannot account for the occurrence of segmentation and fragmentation in general.

(c) *The Relation of Segmentation to Diseases of the Heart.* While the number of cases from which deductions concerning the above question can be made is rather insufficient to warrant any extended analysis, yet the frequency with which segmentation occurs in connection with hypertrophy of the heart, due to the usual causes and often independent of the fatal disease, must be emphasized. Thus, in forty-three adult male cases the hearts of which weighed from 320 to 850 grammes,

segmentation was present in 90 per cent.; in sixteen adult female cases in which the hearts weighed from 270 to 900 grammes, segmentation was found in 68.75 per cent.; or in fifty-nine cases of men and women with hypertrophy of the heart, fragmentation was present in 74.57 per cent. More or less extensive chronic fibrous changes, in the broad sense, were present in most of these hearts. In twenty-one adult cases of atrophy of the heart (in women less than 240 grammes, in the men less than 290 grammes) segmentation, often in slight degree, or merely in the form of visible cement line, was present in 57 per cent. In all these cases it concerns hearts that were actually weighed.

(*d*) *Relation of Segmentation to Sudden Traumatic Death.* In the list are ten cases of death due to traumatism, such as gunshot-wounds and crushing railroad injuries. In the majority death was practically instantaneous. In all some degree of segmentation was present. Two cases occurred in individuals less than twenty years old.

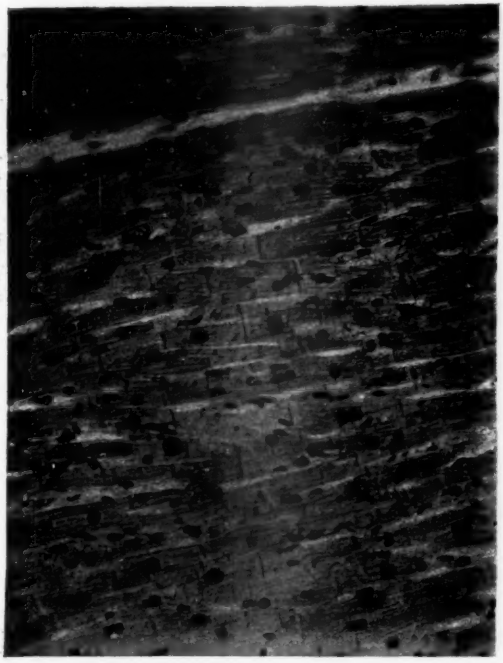
THE NAKED-EYE APPEARANCES OF HEARTS THE SEAT OF DISSOCIATION. In "typhoid" and "asthenic" conditions—in which dissociation is so often present—the heart is usually more or less dilated and flaccid, its muscle reddish, brownish, or grayish-yellow, opaque, and friable or loose in its texture. These appearances, however, depend largely upon accompanying parenchymatous degenerations (*myodegeneratio cordis*). Segmentary dissociation may be present without marked changes in color and consistence. Focal segmentation in particular may be present in the firmly contracted hearts, and von Recklinghausen,[1] Langerhans,[2] and Oestreich[3] describe general segmentation in hearts that were not dilated. Renaut[4] urges the general diastole of dissociated hearts as evidence against segmentation being caused by irregular or violent agonal contractions or ultimate tetanization, as claimed by some, which should leave the heart—in persons examined immediately post mortem—in systole. Segmentation is frequently found in hypertrophic hearts that appear quite firm and contracted. Consequently, changes in color and in consistence, as determined by contraction or dilatation, are not necessarily indicative of dissociation. According to Kaufmann,[5] advanced segmentation may produce wavy swellings on the endocardial surface, especially on the papillary muscles. Oestreich[6] regards increased friability and looseness in texture as very important evidence of dissociation. If, on stroking the cut surface, especially where the fibres run parallel, gently with the knife, clefts and fissures appear numerously in the myocardium, segmentation is quite surely present, even though the heart as a whole may have been quite firm and contracted. This corre-

[1] Loc. cit.
[2] Demonstration eines Falles von Carbolvergiftung, Berl. kl. Wochenschr., 1893, 37.
[3] Loc. cit.
[4] Loc. cit.
[5] Lehrbuch der sp. Path. Anat., 1896, p. 24.
[6] Loc. cit.

sponds with my experience. Focal and slight separation, however, require microscopic examination for their demonstration; and in any event it would not be wholly reliable to base a positive diagnosis of general segmentation on the naked-eye appearances only.

THE HISTOLOGY OF SEGMENTATION AND FRAGMENTATION. Segmentation may present itself in varying degrees. In many hearts distinct, finer or broader, apparently swollen lines, often staining quite

FIG. 1.

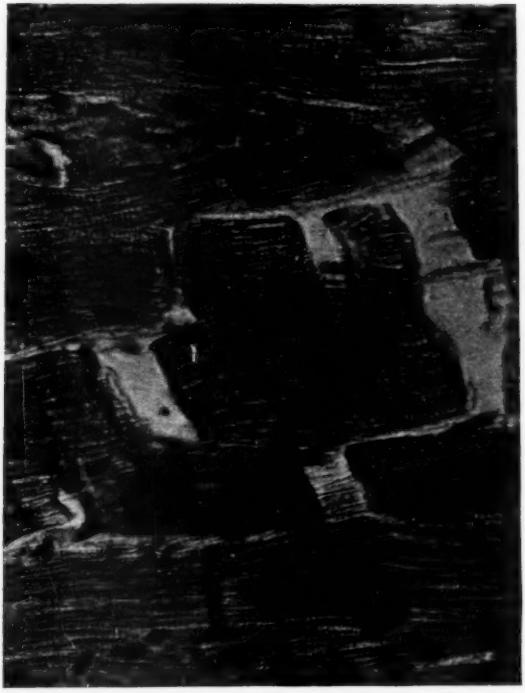


Cement lines visible. Man, aged sixty, carcinoma of stomach. × 125.

deeply with eosin, run transversely across the fibres at irregular intervals (Figs. 1 and 5). The lines may be straight or curved, which is usually the case, or crooked, zigzag, or step-like. Occasionally they extend wave-like through several adjacent and parallel fibres. When diastasis of the fibre has occurred, the substance forming these lines can often be recognized at one of the ends of the separating fibre, while the other end may be smooth or finely irregular or ragged. Incomplete separation along the cement lines is also occasionally observed.

In the twelve instances of this series in which the cement substance was plainly visible in the form of narrow or broader lines, while segmentation was not presented, it concerned in the majority of cases decidedly atrophic and pigmented or fattily degenerated hearts from adult persons dying from chronic tuberculosis (two), diabetes (one), and carcinoma (stomach, three; larynx, one), the heart in each case weighing less than normal and in one case only 125 grammes; but this

FIG. 2.



Cement broad; some segmentation and, in the centre, a segment partly broken across. Man, fifty-six, arterio-sclerosis, rupture of aneurism into pericardium; hypertrophy of heart. × 500.

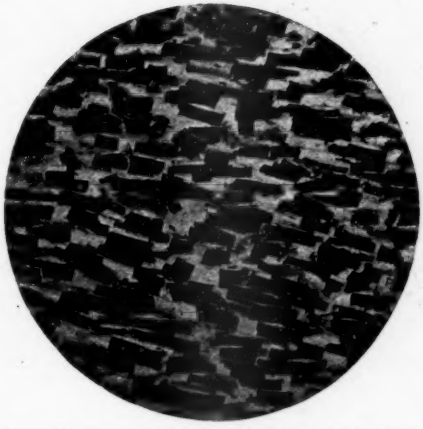
condition was also observed in persons dying from peritonitis after bullet-wound (one), from sarcoma of the pons (one), from carbolic-acid poisoning (one), from cysto-uretero-pyelo-nephritis following rupture of the urethra (one), and from cerebral hemorrhage (one).

In quite a few cases typical segmentation producing larger or smaller

segments with mostly clean-cut ends occurs in smaller or larger foci and not generally throughout the parts examined. In some of these specimens the cement lines are visible about the foci of dissociation (Fig. 2). Often a complete cell with its lateral branches is loosened. The width of the space separating the segments may vary considerably. (In some instances foci of segmentation were not found as usual in the left papillary muscles, but elsewhere in the left ventricle; but this was the case only when there were extensive fibrous changes in the papillary muscles.) In some of these cases the heart is otherwise absolutely healthy. In some there are extensive fibrous changes; in some the nuclei are very large, and extensive fatty degeneration may be present. Occasional tears also occur.

From focal dissociation the process may be said to extend through transition stages of slight, then more and more pronounced separation, to well marked, general segmentation throughout the whole left ven-

FIG. 3.



Marked general segmentation with great diastasis of the pieces. × 120.

tricle. In these instances of marked segmentation the change is also usually present in the right ventricle, and in this case it also occurs first and best marked in the papillary muscles. Segmentation is evidently very rarely present in the auricles. The marked frequency with which the papillary muscles are involved is attributed by Israel to absence of antagonistic diagonal fibres.

Typical segmentary dissociation gives rise to segments that correspond quite generally to the outlines of the muscle-cells isolated by means of solution of potassium hydrate. The ends may be straight, concave, or

convex, dentated, or terraced, often finely irregular; lateral processes are present; larger segments, evidently composed of more than one cell, are also found; small square or oblong segments without nuclei, as well as irregular fragments, frequently occur, evidently due to the mechanical fracture of the lateral processes of the loosened segments, but fracture lines very rarely pass near the nucleus (Fig. 3). More or less diastasis of the segments has usually taken place, and the intervening spaces are oftenest apparently empty. Generally the separated pieces maintain a relatively normal position, but sometimes disarrangement has been brought about, due, it would seem, to the contraction of

FIG. 4.

Acute interstitial myocarditis in pyæmia. Near lower margin a compact micrococcal embolus (staphyloc. pyog. aur.). Leucocytic infiltration, segmentation, leucocytes between the pieces. × 500.

adjacent fibres after segmentation has occurred and to loosening of the interstitial tissues, allowing the bundles to become mixed (Israel[1]). In occasional cases extravasation of red blood-corpuscles has occurred between the ends of the segments—a fact emphasized by Browicz[2] and others in establishing the vital nature of segmentation. In the vicinity of inflammatory foci leucocytes are found between the ends of the pieces (Fig. 4), and in some cases of ante- or post-mortem bacterial invasion

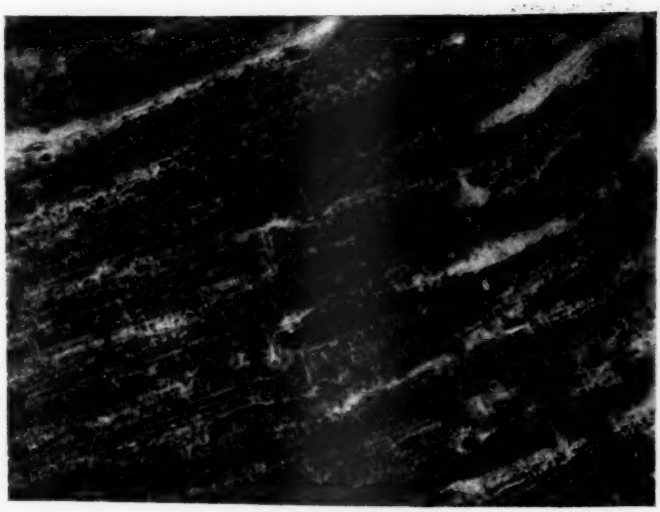
[1] Loc. cit.

[2] Loc. cit.

the spaces may be occupied by micro-organisms (Fig. 7). Generally the separation is complete. Occasionally, however, there are faint indications of the presence of a delicate membrane covering the fibre and still holding the ends together—a sarcolemma, the existence of which in the heart-muscle is, following Eberth,[1] usually denied. Oestreich[2] also notes having observed this delicate membrane. Perhaps the connective-tissue fibrillæ become closely applied to the separating muscle-fibres and give rise to the appearance of a sarcolemma.

Otherwise the section of the heart-muscle may appear perfectly normal, the striations being distinct, the nucleus of usual size, the connec-

FIG. 5.



Cement lines broad and visible in a heart the seat of fatty degeneration. × 500.

tive tissue and bloodvessels unchanged. In many cases the general loosening of the secondary bundles described by Israel is present; or there may be, depending upon general conditions, such as infections and intoxications, parenchymatous and fatty degenerations (Fig. 5) of the sarcoplasma as well as the changes usually included under the term chronic fibrous myocarditis. In a large number of the cases, particularly in hypertrophy of the heart, with or without chronic myocardial changes, there is noted marked increase in the size and changes in the shape of the nuclei of the muscle-cells. The nuclei may indeed be giants in size.

[1] Loc. cit. [2] Loc. cit.

In shape they may be greatly elongated and cylindrical or spread out in the form of oval masses; club-shaped, kidney-shaped nuclei, and nuclei with budding processes and curiously shaped outgrowths also occur; some are vesicular, others stain very deeply, and sometimes they present surface markings, due probably to the imprints of pressure, which may give the nucleus an appearance as though it were to split longitudinally (Fig. 6).

Fragmentation, tearing, or breaking of the muscle-fibres, usually present to some extent in all cases of marked segmentary dissociation, as shown by the presence of small fragments often without nuclei, in

FIG. 6.

Cylindrical and peculiarly shaped giant nuclei; in the centre a cell with vacuolar degeneration of its protoplasm. Man, age fifty, heart weighed 700 gr., fibro-myocarditis. × 500.

some cases occurs to a more marked extent, and may be the predominating form of disunion. The lines of separation may pass through any part of the muscle-cell, often passing around one pole of the nucleus, the margins or ends of fragments being more irregularly ragged than in segmentary dissociation. Incomplete rupture may occur. Fragmentation, strictly speaking, never occurs to such an extent and does not give rise to separation into such minute pieces as does segmentation. It appears to bear the same general relations to acute and chronic diseases as segmentation, and in agreement with Bard, Renaut, and others the conclusion seems warranted that it is caused largely by mechanical

rupture or breaking of the fibres on account of various degenerative changes that render the sarcoplasm brittle.

THE DISTINCTION BETWEEN SEGMENTATION AND FRAGMENTATION. In the foregoing the attempt has been made to consistently employ the words segmentation or segmentary dissociation and fragmentation to designate two distinct conditions, each in the main well described by the term applied to it—segmentation referring to the division of the muscle-cells at the lines of junction in the muscle-fibre, fragmentation to the rupture or break of the fibre regardless of the cement lines.

While Renaut[1] and his pupils, Browicz[2] and others, insist that the interruption of the continuity of the cardiac muscle-fibres that gives rise to the characteristic appearances described by them as *myocardite segmentaire* occurs principally along the lines of union between the single muscle-cells, others claim that the lesion is produced essentially by ruptures or breaks of the muscle-fibres without any special reference to the limits of the individual cells.

Browicz regards all interpretations of segmentation that do not make the limits of the pieces correspond with the limits of the cells as erroneous. He does not lay so much stress on the mere dissociation of the muscle-cells, which probably is an agonal product, as upon vital pathological conditions of the intercellular substance, manifesting itself by the fact that the lines of junction become visible. It may be a homogeneous seam, a broad stripe, or a broader layer whose contours are sharply separated from the ends of the cell. In this space are then found short, stave-like formations running parallel to the long axis of the muscle-fibre (*"breitstreifige, stäbchenformig gebaute Kittsubstanz"*), and such changes may alternate with distinct dissociation. In this statement Browicz has been in a measure substantiated by Przewoski's[3] investigations, which show by special methods that at the ends each muscle-cell has a layer of granules, the *stratum granulosum terminale.* Browicz looks upon these changes in the cement as the initial phase of segmentation.

Eberth[4] long ago called attention to the fact that in atrophic and pigmented hearts the fibres may separate into single cells without any manipulations, and he ascribes this dissociation to fragility of the cement.

Goebel[5] also regards segmentation as beginning with changes in the intercellular cement, and the separation as occurring at the lines of union between the cells.

v. Recklinghausen,[6] Marchand,[7] Oestreich,[8] and Bard[9] lay stress upon

[1] Loc. cit. [2] Loc. cit.
[3] Cited by Browicz, loc. cit. [4] Loc. cit.
[5] Beiträge zur fettigen Degeneration des Herzens, Centralb. f. Allg. Path. u. Path. Anat., 1893, Bd. iv. p. 728.
[6] Loc. cit. [7] Loc. cit. [8] Loc. cit. [9] Loc. cit.

the rupture of muscle-fibres as an important step in producing the *état segmentaire* of Renaut. In fact, the last two regard multiple ruptures as the essential occurrence. It concerns fragmentation in the strict sense, and not segmentation, and the process does not depend upon changes in the cement substance (v. Recklinghausen[1]). Oestreich[2] found that some of the fragments were so small that they could not possibly be whole cells. Furthermore, that the lines of rupture very often passed across the fibre in the immediate neighborhood of the nucleus, and sometimes in a curve around one pole of the nucleus, half of which would then project into the indentation of the corresponding fragment. He also found that the fragments were more like the artificial muscular bits described by Eberth than like isolated muscle-cells. Finally, he was able by means of the action of acetic acid to demonstrate the presence of unchanged cement lines near rupture lines. Often the rupture would pass across the fibre near the unchanged lines of union.

While Oestreich[3] is surely correct in the statement that many fragments are too minute to represent whole cells—fragments without nuclei also occur—as well as in the observation that rupture lines often pass immediately around the nucleus, I have not been able to confirm the statement that the fragments generally resemble artificially produced muscle-morsels nor to demonstrate by addition of acetic acid normal cement lines in all hearts the seat of marked dissociation. Eberth[4] describes artificial muscular detritus as presenting more clean-cut and more nearly straight ends than the isolated muscle-cells, the ends of which are usually finely irregular, while occasional fibrillæ may project from the ends of forcibly produced fragments, yet the ends of the fibrillæ are not pointed, but cut off squarely. Oestreich uses this statement as a standard in distinguishing between segmentation and fragmentation in human hearts. When making the statement Eberth[5] does not refer to any special species, but to normal heart-muscle in general. Segmentation is a morbid process. There is, therefore, no inherent reason why it may not cause disunion of the muscle-cells and yet the ends be square and clean-cut. For these reasons no weight can be given the conclusions drawn by Oestreich after comparing the segments of dissociation with the artificial fragments described by Eberth.

Histologists—as, for instance, Schweigger-Seidel, in Stricker's *Handbook*—also describe normal muscle-cells with smooth ends, and believe the difference in the limiting surfaces to be occasioned by the circumstance that the muscle sometimes comes under observation in a contracted, coagulated condition. I think it will be found that the ends of fragments of the normal human heart produced by force, pressure,

[1] Loc. cit. [2] Loc. cit. [3] Loc. cit. [4] Loc. cit. [5] Loc. cit.

tearing, bending, which I presume is what is meant when Eberth speaks of "artificially produced muscular detritus," are strikingly ragged and irregular, the fibrillæ yielding unequally. Furthermore, in typical, general, marked segmentation, such as is shown in Fig. 3, it is not generally possible to demonstrate any cement lines. On the other hand, the outlines of the segments correspond very nicely to the shape and the size of the isolated muscle-cell, which, forsooth, they often are; nor is it usual to find in such specimens that a line of separation crosses a segment in the region of a nucleus. The study of cases of focal or slight dissociation will also be found to substantiate quite fully the statements of Browicz[1] in regard to the coexistence of visible cement lines and actual segmentation. On the other hand, fragmentation in the strict sense also occurs, as acknowledged by Renaut,[2] although probably not to the extent claimed by Oestreich,[3] and here the ruptures very often cross the fibres near the nucleus, and hence probably inside the limits of the single muscle-cells. The nucleus, however, is not always central. It may be found quite near one end of the cell. In many specimens it is also possible to demonstrate the coexistence of cement lines independent of the fracture lines, the ends on each side of the latter being usually very irregular and ragged, as if the fibre had been torn forcibly across, the fibrillæ offering unequal resistance.

The conclusion is therefore in order that segmentary dissociation as well as actual fragmentation or rupture of the fibres of the heart-muscle both occur.

Distinction should be made between typical segmentary dissociation of the heart muscle-fibres, in which softening or complete solution or perhaps excessive brittleness of the cement allows the muscle-cells and segments to move away from each other, and fragmentation in the strict sense of the word, it which it essentially concerns ruptures of the muscle-fibres in any part of their course and without any special reference to the lines of union. This distinction is quite important, because the possibility that fragmentation may be, to a certain and perhaps large extent, artificial, cannot be altogether excluded, while segmentation cannot be produced by the action of ordinary reagents and manipulations. For these reasons I have preferred to deal more with segmentation than with fragmentation. Segmentation and fragmentation frequently occur in varying degrees. In any large series of hearts it will be found that it is quite feasible to separate the specimens into two groups, according as one or the other of these forms of interruption in the continuity of the muscle-fibres predominate; but true segmentation is by far the more frequent.

[1] Loc. cit. [2] Loc. cit. [3] Loc. cit.

THE CAUSES, NATURE, AND CLINICAL SIGNIFICANCE OF SEGMENTATION. The views concerning the nature and the cause of segmentary dissociation have, as noticed, failed to harmonize. It was the earlier belief of Renaut[3] that it concerned a primary, nutritive, or chemical change of the cement substance. This view has been supported by his pupils, by Browicz,[1] v. Zenker,[2] Tedeschi,[8] and in part by Israel[4] and Dunin.[5]

Durand[6] and Duplaix[7] claimed that in circulatory disturbances more or less permanent œdema of the myocardium may be produced, and the substances contained in the œdematous fluid, such as sarcolactic acid, may dissolve the cement, holding the muscle-cells together in the form of muscle-fibres. Durand[6] calls attention to the direct action of very feeble solutions of chromic and other acids upon the cement; but Colrat[9] produced œdema of the heart experimentally without the occurrence of segmentation. Segmentation also occurs in many conditions, such as atrophy of the heart, sudden traumatic death, etc., without the presence of œdema.

v. Recklinghausen,[10] Oestreich, and Rosenbach[11] look upon the change more as a mechanical disunion and rupture of the muscle-fibres on account of disturbances of innervation and irregular contraction in the death agony, favored perhaps by brittleness of the fibres due to degenerative changes. Oestreich[12] says fragmentation does not cause death but the last contraction causes fragmentation. Rosenbach[13] states that a maximal contraction precedes dissociation, and that it may be regarded as proved that it is due to the crossing of impulses of different nature in a dying heart. When an impulse of excitation meets an inhibitory impulse, separation of the fibre occurs. Letulle[14] expresses the opinion that segmentary dissociation is due to an agonal imbibition of the muscular fibres with sarcolactic acid. Finally Renaut,[15] in his efforts to overthrow v. Recklinghausen's[16] and Ostreich's[17] views concerning the essentially agonal nature of segmentation, advances the claim that it is the last step of a complex, dystrophic, cellular process, involving the muscle-cells and leading to softening and solution of the intercellular substance.

Lepine and Molard,[18] in 1891, described certain degenerative changes in the heart muscle-fibres as a particular species of non-sclerotic, parenchymatous myocarditis. The changes consist in the appearance of clear spaces between the primitive fibrillæ, which are thereby forced apart.

[1] Loc. cit. [2] Loc. cit. [3] Loc. cit. [4] Loc. cit.
[5] Loc. cit. [6] Loc. cit. [7] Loc. cit. [8] Loc. cit.
[9] Loc. cit. [10] Loc. cit. [11] Loc. cit. [12] Loc. cit.
[13] Loc. cit. [14] Anatomie Pathologique (Cœur, Vaisseaux, Poumon), Paris, 1897.
[15] Loc. cit. [16] Loc. cit. [17] Loc. cit.
[18] Sur une espèce particulière de myocardite parenchymateuse (sans sclérose), Arch. de Méd. Expérim., 1891, p. 777.

These spaces are largest near and about the nucleus, which is increased in volume, round, ovoid, or elongated. In consequence of these conditions the fibres, when cut longitudinally, present a bulging enlargement corresponding mainly to the situation of the nucleus. The heart that is described as presenting these changes in typical form weighed 560 grammes, was dilated, and came from a man seventy-eight years old. Segmentation and other lesions are described as absent. Subsequently, however, Renaut, in 1894, calls attention to the fact that segmentation was present in all of Lepine's and Molard's preparations, and, based on further studies, he makes the hyperplasmic atrophy or vacuolar disinte-

FIG. 7.

Segmentation; bacilli upon and between the segments; to the left of the centre a cell with vacuolar degeneration and containing two nuclei. Man, fifty, died instantly from crushing injury of abdomen. × 500.

gration and gigantism of the nuclei, described by these authors, steps in a complex process leading to segmentation. The enlargement of the nucleus, the increase of the amount of the chromatin, are interpreted by Renaut as evidences of augmented nuclear activity, the muscle-segment assuming, as it were, a more intense "nuclear life," while its function and its structure as a contractile element fall into abeyance, and the intercontractile substance is liquefied. *La cellule vit dès lors bien plus cellulairement que musculairement.* Finally the cell softens or dissolves its cement, which may swell up and become permeable to the corpuscles of the blood and the lymph. The muscle-cell is now functionally incapacitated, and general segmentation is the anatomical sign

and final lesion of cardiac asthenia. The "hyperplasmic atrophy" of Renaut, as well as the special form of parenchymatous myocarditis of Lepine and Molard,[1] would seem to correspond very closely to vacuolar degeneration of the muscle-fibres (Figs. 6 and 7), which is due to a colliquative disintegration of the sarcoplasm. It is often associated with enlargement or vesicular tumefaction of the nuclei, and is generally observed in connection with interferences of the coronary circulation (Letulle[2]), and occurs probably also in diverse general intoxications. This condition may or may not be associated with segmentation. Incidentally attention may be called to the fact that spaces in the muscle-fibres of the heart very much similar to these vacuoles have been interpreted as capillaries within the muscle-fibres by Meigs.[3]

Segmentation occurs frequently in association with hypertrophy of the heart, with or without degeneration. Here, also, enlargement of the nuclei, which may assume various shapes, is, as a rule, present. Letulle[4] states that every muscular fibre that hypertrophies presents a proportional enlargement of the nucleus; and Tangl,[5] who made his observations upon the left ventricle of the hearts of rabbits, the hypertrophy being secondary to experimental traumatic lesions of the aortic valve, found the nuclei of the hypertrophic cells of varying shape, mostly oval, sometimes with central constrictions. Often the nuclei were very long, and they seemed in general to enlarge with the cells. Furthermore, the nuclei were surrounded by a granular substance that coalesced with the protoplasm of the periphery of the cell in which small vacuoles were occasionally seen. Evidently the enlargement of the nuclei and their richness in chromatin in purely hypertrophic hearts belong to the hypertrophic process, and cannot in general be assumed to be evidence of any "dystrophy" leading to segmentation. According to Tangl, it is not entirely impossible but that vacuolation of the sarcoplasm may also occur in pure hypertrophy.

Finally, it must be borne in mind that segmentation occurs without "hyperplasmic atrophy" and "gigantism of the nuclei," as witness segmentary dissociation of healthy hearts in connection with sudden, traumatic death, as well as in other conditions. Hence Renaut's claim that segmentation depends upon the existence of a special dystrophic process of the myocardium proper, marked by vacuolar changes in sarcoplasm, by gigantism of the nuclei, and by solution of the cement, is to be regarded as rather broad, first, because segmentation occurs in otherwise healthy heart-muscle; second, because although segmentation occurs generally in hypertrophic hearts, often with secondary degenera-

[1] Loc. cit.
[2] Loc. cit.
[3] The Microscopic Anatomy of the Human Heart, Transactions of the College of Physicians of Philadelphia, 1891; and THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 1891.
[4] Loc. cit.
[5] Ueber die Hypertrophie und das physiol. Wachsthum des Herzens, Virch. Arch., 1889, Bd. CXVI. p. 452.

tive changes, yet it has not been demonstrated that the enlargement of the nuclei observed in such heart-muscle is always dystrophic or degenerative, and not to a large extent progressive and hypertrophic in its nature. The entity of Renaut's dystrophic process is, therefore, still questionable.

Segmentary dissociation occurs so frequently in connection with various acute and chronic myocardial changes as to warrant the conclusion that the cement substance may be altered, softened, or rendered brittle by direct action of general conditions as well as indirectly on account of primary or secondary lesions of the muscle-cells. Broad, visible cement layers, focal segmentation, segmentation confined to districts of fatty degeneration in the heart-muscle, dissociation about acute myocarditic foci with leucocytes between the segments, the limited segmentation that occurred around Tedeschi's[1] aseptic wounds of the heart, all point in this direction. Consequently it would seem that v. Recklinghausen's claim that it is not shown that segmentation can occur before the death agony no longer holds good.

It stands to reason that the changes in the muscle-cells must influence the quality of the cement. This seems actually demonstrated in the following case, instances similar to which I could duplicate:

Ambrosius[2] details the case of a woman, aged forty years, who died ninety hours after the removal of the tubes and ovaries under chloroform. There were fatty degeneration and exquisite segmentation of the heart muscle with vesicular nuclei. The degree of fatty degeneration corresponded nicely to the limits of the different degrees of segmentation, pointing to the presence of a vital, histological variation in the different fibres, and permitting the inference that dissociation occurs in places prepared for it by changes in the muscular tissue.

As the cement becomes changed focal and general dissociation may occur under normal or abnormal conditions of cardiac activity. Diastasis and disarrangement of the pieces may follow in degrees commensurate with the vigor and the irregularity of the contractions. The coexisting brittleness of the sarcoplasm and presence of loosened segments between still contracting muscular bundles may lead to more or less extensive fragmentation. The conditions present in diseased and especially in hypertrophic hearts favor dissociation. Here are lesions of various kinds of the muscle-cells, of the stroma, and of the blood-vessels that may weaken the cement and the plasma of the cells, and also marked disturbances in the vigor and order of the contractions. It is certainly difficult to account satisfactorily for segmentation in cases of traumatic, sudden death in which the heart-muscle is plainly normal

[1] Loc. cit.

[2] Ein Fall von spät eingetretenen Tod nach Chloroforminhalation nebst Bemerkungen zur Fragmentatio Myocardii, Virch. Arch., Supplementheft, 1895, Bd. cxxxviii.

in its structure. In general it may be assumed, however, that dissociation of the muscle-fibres results from a disproportion between the vigor of the muscular contractions and the muscular cohesion. Segmentation and fragmentation may, therefore, occur in normal heart-muscle if its contractions be excessively violent and irregular, as may be the case, for instance, in hanging, in sudden *exitus letalis* during coitus, in excited states, in delirium, etc., and thus become the immediate cause of death because the heart can then no longer contract. In weakened hearts, violent or irregular as well as quite normal contractions may cause dissociation, suspending further cardiac action; but this cannot be designated a true agonal change in the ordinary sense conveyed by this term.

The views as to the existence of segmentation in a form susceptible of clinical recognition (segmentary myocarditis of Renaut) are divided. Renaut and his scholars claim that in the old the condition occurs in such a typical form that it may be diagnosed, and that it should therefore be regarded as a clinical entity. This view has not gained general acceptance. Primary, independent segmentation is not yet recognized. Aufrecht,[1] in a short article, champions its existence.

Aufrecht describes a case in a man, forty-eight years of age, who died from the general symptoms of heart-failure, with œdema of the lower extremities. In the left ventricle there was universal segmentation, with hemorrhage between the segments, which are stated to have been normal with but occasional cloudiness. There was some hypertrophy of the right ventricle, which he interprets as secondary to the segmentation in the left, although the influence of a moderately marked pulmonary emphysema cannot be excluded.

Aufrecht regards this case as one of primary, independent segmentation of the left ventricle. There exists no ground, he claims, for not believing that a dissociated heart may not work as long as one the seat of parenchymatous degeneration. The muscle-fibres might undergo separation little by little, and the process need not necessarily coincide with the agony.

All the other authors regard general and focal segmentation as an accidental or secondary phenomenon occurring in the course of infections and intoxications in connection with the primary and secondary lesions of asystolic hearts, and with fatal traumatism. It constitutes, as is also shown by the statistics brought forward in this paper, an episode in the course of the principal affection. While it possesses an anatomical individuality, it is so common that it would be difficult to say in what disease it would surely be absent after, say, the twentieth year, and it would take a very long time to enumerate all the diseases in

[1] Ueber einen Fall von primärer Fragmentation des linken Ventrikel, Zeitschr. f. kl. Med., 1894, Bd. xxiv. p. 205.

which it has been found present. Its presence may explain this or that detail in the clinical course of a number of processes, such as the termination by sudden death; but it is secondary, it is not a disease in the strict sense any more than cloudy swelling, for instance, and cannot, therefore, be considered as entitled to a place in our nosology.

General segmentation is inconsistent with the continuance of the heart's action. Its presence in cases of arterio-sclerosis, coronary disease, fibrous myocarditis, etc., that die suddenly, is consequently a satisfactory anatomical reason for the sudden fatal ending. In medico-legal practice cases of sudden death under more or less suspicious circumstances, or without any apparent cause, occasionally occur in which the most careful post-mortem fails to reveal any other explanation of death than general myocardial segmentation, as, for instance, in this example:

An apparently healthy man, twenty-three years of age, was "fooling" with two friends. Two hats were knocked off, and, as one of the men picked up his hat, he observed that his friend—the dead man—had fallen to the floor unnoticed. It was thought that he was shamming, but after waiting three or four minutes it was found that he was dead. At the post-mortem, ten hours after death, and made by Dr. Louis J. Mitchell, all the organs, including the brain, were macroscopically normal. The heart, especially the left ventricle, was flabby and dilated. Microscopic examination showed the heart—unfortunately this was the only organ that could be examined—the seat of a general and typical segmentation.

In this case there is not much doubt that the extensive dissociation caused death, but the cause of the dissociation is not clear.

Ramond[1] reports the case of a thirty-year-old professional runner who fell ill after a run of thirty kilometres on a hot July day. There were fever, dyspnœa, *delirium cordis*, and anuria, death ensuing in a few hours. The post-mortem showed hyperæmia of all the organs and a flaccid, dilated heart. Microscopic examination showed absence of myocarditis, but a marked general segmentation and fragmentation of the fibres, with much extravasated blood. The nuclei stained well, and the transverse striæ were distinct. Ramond regards toxins due to muscular overexertion as the cause of the lesions.

While general fragmentation is obviously inconsistent with continued heart's action, focal segmentation need not, it would seem, of necessity, result in death. Browicz concluded that general segmentation leads to sudden death, but focal to cardiac insufficiency, or, possibly, to rupture of the heart or to fibrous substitution of the separated muscle-cells. The last two conclusions he states he is unable to substantiate.

[1] Dissociation segment. du myocard dans un cas de cœur forcé. Bullet. et mem. Soc. Méd., 1896; abstracted in Centralbl. f. Allg. Path. u. Path. Anat., 1897, viii. p. 236.

Robin[1] found segmentation along the margins of the ruptures in two hearts in which were also endo- and peri-arterial changes. He looks upon the segmentation as the essential cause. Tedeschi[2] examined the muscle in the vicinity of the ruptures in two hearts. In one instance there were found chronic fibrous interstitial changes as well as scattered foci of fragmentation. In the second case there were no fibrous changes about the point of rupture, but blood-corpuscles were present between the isolated, single muscle-cells. Subsequently Tedeschi had opportunity to examine three additional museum specimens of spontaneous heart rupture, with, he states, the same result as in the last case above. From these results it would seem that, while complete details are not at hand, still, in some cases, segmentation and spontaneous heart rupture stand in such very close relation to each other that the question merits further study.

Of all the parts of the heart, segmentation occurs most frequently in the papillary muscles of the left ventricle. It is often present in a marked degree in these muscles only. If it occur some time before death, the result might be mitral regurgitation, taking it for granted that a dissociated papillary muscle is incapable of contraction, because physiologists in general agree (Landois and Sterling, Curtis, in *The American Text-book*) that it is the function of these muscles, by their contraction during ventricular systole, to hold the mitral valves taut and thus compensate for the narrowing of the cavity of the ventricle. Mitral regurgitation induced in this way may account in some degree for the marked pulmonary congestion so frequently present in cases associated with myocardial segmentation.

If it be assumed that segmentation may occur in foci some time before death, several important questions arise concerning the fate of the loosened cells. Of course the isolated, non-nucleated protoplasmic masses that are often split loose could not maintain their vitality. On the other hand, would the nucleated but dissociated cells necessarily die and become replaced by fibrous tissue? Is the vitality of the muscle-cell dependent upon the integrity of its cement? Could a reunion of the isolated muscle-cells by means of new cement occur? These are questions that cannot be answered at this time. Koester[3] remarks that the yellow degeneration (*enartung*) which is followed by scar-formation in the myocardium does not, in slight degrees, differ to any extent from the segmentary myocarditis of Renaut. I have studied carefully the appearance of the muscle-fibres in and about myocardial scars, and it has seemed that the fibres, generally speaking, undergo atrophy without segmentation. Segmentation rarely occurs in the muscle-fibres embedded

[1] Loc. cit. [2] Loc. cit.
[3] Verh. d. X. Intern. Med. Congr., Berlin, 1890, Bd. ii. Abth. ii.

in scars. Any evidences of replacement of muscle-segments by fibrous tissue were not found. It therefore appears reasonable for the present, in view of the uniform absence of any evidence of reactionary changes, to regard even focal segmentation as at the most a product of limited ante-mortem duration. In conclusion the facts brought forward may be summarized as follows:

The cardiac muscle-fibres frequently separate into muscle-cells and irregular fragments. Segmentation and fragmentation are due to disproportion between the vigor and order of muscular contraction and muscular cohesion. They occur in normal heart-muscle due to excessively vigorous and irregular contractions. More frequently they are encountered in association with acute and chronic, secondary, and primary myocardial changes that alter the cement, weaken the plasma, and predispose to dissociation under normal or increased heart's action. General segmentation is of brief duration, because its occurrence is incompatible with further cardiac contractions. Focal or limited segmentation may, perhaps, cause incompetency of the auriculo-ventricular valves, especially the mitral. It may lead to cardiac insufficiency, and, possibly, to rupture of the heart. The fate of loosened muscle-cells is not known. It seems, however, that focal dissociation is of but short ante-mortem duration. The occurrence of primary segmentation as a distinct disease is not proven.

PATHOLOGICAL LABORATORY, RUSH MEDICAL COLLEGE, CHICAGO.

REVIEWS.

LECTURES ON THE ACTION OF MEDICINES: BEING THE COURSE OF LECTURES ON PHARMACOLOGY AND THERAPEUTICS DELIVERED AT ST. BARTHOLOMEW'S HOSPITAL DURING THE SUMMER SESSION OF 1896. By T. LAUDER BRUNTON, M.D., D.Sc. (Edin.), LL.D. (Hon.) (Aberd.), F.R.S., Fellow of the Royal College of Physicians, Associate Fellow of the College of Physicians of Philadelphia; Honorary Member of the Pharmaceutical Society; Physician and Lecturer on Pharmacology and Therapeutics to St. Bartholomew's Hospital. Pp. xv., 673. New York: The Macmillan Company, 1897.

THESE lectures are intended to give a general sketch of the mode in which drugs act upon the body, and should receive criticism from the stand-point of the author. As he very pertinently remarks, "any man who tries to pass an examination upon them alone will not be at all likely to get the maximum number of marks," yet the very attractive style of the author invests many of the dry bones of therapeutics with the interest of more congenial, though less important, subjects. Even if the student must turn to a more systematic text-book, that the sum of his knowledge shall equal the demands of school or State, he will enter upon his more serious study with greater enthusiasm. It is the physician who should read this book, not because it contains much that is new or startling, but for the many suggestions so frequently encountered. For him, more than for the student, the form of lectures is desirable. He can overlook the unimportant and rest when *causerie* displaces instruction, and in its perusal in many instances broaden his horizon and readjust his perspective. Repetitions, then, need not be irksome, nor inadequate treatment become disappointing, for there is enough within the covers of this work to interest even the expert therapeutist. As the strong points of this book—its suggestiveness, its impressiveness, and its directness in statements of fact—come from the personality of the lecturer, so do its weak points depend upon the form which it takes—that of lectures. These are its sketchiness in places, its failure to record present knowledge, for instance, that upon hypnotics and anæsthetics, and finally the insertion of too many anecdotes, based upon personal experiences, some of sufficient variety to suggest that his lot has been marked by unusual circumstances.

We could wish that recent chemical nomenclature had been adhered to. But this can be overlooked when we find that "transfusion" has replaced the usual "perfusion" and that "sternutitories" (p. 237) is almost the only error in orthography. We do not recognize as peculiarly an Americanism that people cough so severely that they "look as though they were going to 'cough up their immortal souls'" (p. 279),

for this would involve a discussion as to the limiting adjective, but to our mind the statement that at the explosion of an oxygen cylinder a "boy was completely blown up by it" (p. 284) is equally objectionable.

In general, the author's facts are well established; exception, probably, could be well taken to the vessels of the brain losing their tone (p. 185). Even if the author's fancy may lead him away from the facts which are strung together by it, we must not lose sight of his earnestness in purpose, though the manner may seem trifling. An addition of real value is found in the illustrations, many of which are both striking and original.

We have read this volume with great interest and profit. We recommend it to the physician, not so much to the student, for him to read and ponder, and he will find that he is opening up new fields and more thoroughly tilling old ones. R. W. W.

ESSENTIALS OF OBSTETRICS. By CHARLES JEWETT, A.M., M.D., Sc.D. Illustrated by eighty wood-cuts and three colored plates. 12mo. pp. 350. New York and Philadelphia: Lea Bros. & Co., 1897.

IN the preface to this volume Dr. Jewett distinctly states that he has endeavored to place concisely and clearly in a systematic and logical arrangement the essentials of obstetrics, within easy grasp of the student. He believes that such works have value in teaching, within their proper limit. He has succeeded in his undertaking, and his book forms an excellent introduction to a larger treatise.

His description of the anatomy and physiology of the female genitalia is excellent. We note that in computing the period of gestation he prefers to take the dimensions of the gravid uterus rather than estimate the length of the fœtus. In treating of the diagnosis of pregnancy he tabulates the causes for the cessation of menstruation which might be confused with early pregnancy. He carefully describes Hegar's sign, and illustrates the method of examination. In estimating the excreta of the pregnant patient, he believes that quantitative tests for urea furnish the best evidence of the activity of the kidneys. Our experience leads us to fully agree with him in this belief. In treating of pelvic measurements we fail to find a method of obtaining the oblique pelvic diameters by external examination. We have used to advantage the measurement from the posterior-superior spine of the ilium of one side to the anterior-superior spine of the opposite ilium.

In dealing with the presentations and positions of the fœtus, we should imagine that the student might be confused by the author's statement of four positions for each presentation and his description of face presentations. It seems very desirable that the number of positions be made as small as possible, and that the clinical phenomena of rotation be made as clear as possible. Our experience indicates that students learn best the phenomena of labor and the reasons for them in this way. In describing the rotation of the head, it is said to be due chiefly to the slope of the lateral halves of the pelvic floor, while the author also recognizes the importance of a firm pelvic floor.

The statement of methods of examination is interesting, and accom-

panied by a number of original illustrations. Minute directions are given for preparing for labor, and we note his caution that mercurial irrigation, if used at all, should be followed by douching with plain sterilized water, to avoid danger of mercurial poisoning. For internal examinations, the author has found the dorsal position best; we have often been able, by turning the patient on the side, to pull back the pelvic floor and make a better examination than in the dorsal position.

The author prefers chloroform for obstetric anæsthesia, and ether for operative cases. He would close lacerations of the cervix when they are accompanied by bleeding. In his description of the preparation of silk in melted paraffin for sutures, we are reminded of the usage of a surgeon long since dead, who employed wax for a similar purpose. The closure of perineal lacerations is illustrated by diagrams.

In treating of the puerperal state, the importance of thorough examination to ascertain that recovery is perfect is urged. The patient is allowed to get out of bed six or eight hours after labor to use a commode, rather than allow the catheter to be passed.

The care of the infant is briefly but clearly given, and Pasteurization of milk in place of full sterilization is advised.

The pathology of pregnancy and of the fœtus follows next, and concise directions are given for the treatment of abortion. Ectopic gestation and the pernicious vomiting of pregnancy are also described. The pathology of pregnancy receives adequate treatment, and contraction of some degree in the pelvis is said to be present in from 10 to 15 per cent. of all cases. In describing the indications for various operative procedures, symphysiotomy is said to be applicable when the true conjugate is above three inches and there is but little contraction in the other diameters. The same operation is again recommended in impacted and irreducible brow presentation. Abnormalities of the fœtus next receive attention. Hemorrhage and eclampsia are thoroughly treated; in the latter the author considers fluid extract of veratrum viride a useful prophylactic. He considers it of great value in preventing the paroxysm.

The pathology of the puerperal state naturally includes a description of puerperal septic infection. In the treatment of this condition the value of strychnia is thoroughly recognized.

In obstetric surgery occurs a description of the author's method for performing symphysiotomy; he chooses the so-called open operation, and illustrates it with two excellent drawings. He distinguishes cœlio-hysterotomy from cœlio-hysterectomy, and states that the latter has frequently superseded Porro's operation.

As a whole, the book contains within convenient compass the essentials of modern obstetric practice, and may well be used by the student to prepare him for reading a larger treatise. E. P. D.

THE EYE AS AN AID IN GENERAL DIAGNOSIS. A Handbook for the Use of Students and General Practitioners. Octavo, pp. 248. By E. H. LINNELL, M.D. Philadelphia: The Edwards & Docker Co., 1897.

THIS work presents the wide relations of the eye in general diagnosis in a way that is likely to command the attention of the mass of general

practitioners. These relations have been understood and appreciated more or less completely by those especially engaged in ophthalmic practice, and attempts have been made to call to them the attention of others, especially the attention of general practitioners, as in Part III., "Diseases of the Eye in Relation to General Diseases," in Nettleship's work on *Diseases of the Eye*, and the chapter by Norris in Pepper's *System of Medicine*. But we believe that nowhere have the essential points been presented so clearly, and with fair completeness, in a separate work of moderate size until the publication of this one.

The book is divided into three parts. The first, including the "Eye Symptoms of Nervous and Constitutional Disease," closes with an alphabetically arranged table of such diseases, with the characteristic eye-symptoms of each. The second part, entitled "Reflex Neuroses," gives a good summary of the remote effects ascribed to eye-strain, a subject that has given rise to considerable literature during the last few years. Part III. deals with "Ocular Affections of Toxic Origin," and the work concludes with a partial bibliography and a good index.

The work is well written and sound in its teaching, although in the part on "Reflex Neuroses" it seems to attach to the deviations from perfect muscular balance an importance that ophthalmic surgeons are by no means agreed to accord to them.

The author is one of the collaborators of the *Homœopathic Eye, Ear, and Throat Journal*, yet a careful reading of the book might not reveal this, for there is not the slightest indication of the peculiar views of Hahnemann. The authorities quoted are nearly all familiar leaders in the literature of modern ophthalmology, and even when the above-mentioned journal is referred to the sectarian part of its name is omitted.

The book has been well printed except that the number and size of its pages might have been reduced somewhat without the sacrifice of anything more important than blank paper. It is illustrated with a few good diagrams, chiefly of the field of vision and nerve-tracts concerned in vision.

E. J.

LECTURES ON ANGINA PECTORIS AND ALLIED STATES. By WILLIAM OSLER, M.D., Fellow of the Royal College of Physicians, London; Professor of Medicine, Johns Hopkins University, Baltimore; author of *A Practice of Medicine, Lectures on the Diagnosis of Abdominal Tumors*, etc. Pp. 155, with an appendix. New York: D. Appleton & Co., 1897.

IT has seemed to the present reviewer that in the review of medical writings there are times, of far too frequent occurrence, we fear, when the personality of the author, or the reviewer's conception of his personality, is the subject of criticism. In other words, the author is not separated from an impartial review of his work.

In the case of Dr. Osler, however, the individuality of his thought and style of expression render it most difficult for the reviewer to whom his personality is familiar to separate the man from his product. Nor does an attempt to accomplish this seem to us to be advisable, since that which creates the difficulty at the same time obviates the necessity for its correction.

In the monograph at present under consideration there is collected a

series of seven lectures on "Angina Pectoris and Allied States," as they were delivered to the graduate class in medicine at the Johns Hopkins Hospital. The first lecture of the series is mainly historical and nosological in its scope; the second treats of the etiology and general description of the malady; the third describes the phenomena of the attack; the fourth deals with allied and associated conditions; the fifth with pseudo-angina pectoris; the sixth with the theories of the disease; and the seventh and final lecture with the diagnosis, prognosis, and treatment.

Adopting what some one has termed the English style in the extensive report of his cases, the author runs a risk at times of his subject dragging, a crisis averted only by his inimitable style and apt illustration. The historical sketch, enriched as it is with many quotations that only the author's breadth of research and the thoroughness that characterizes his writings in general would lead us to expect, is one of the most interesting lectures of the series.

In all that portion of his subject that bears in any way upon its pathological side Dr. Osler is at his best, and his wide experience is everywhere evident. Here, too, as is usually a feature in most of his writings, a large series of cases occurring within his own experience affords abundant material for illustrating the different phases of his subject.

The value of this contribution to the subject of angina pectoris can hardly be overestimated, as it must constitute a basis upon which further researches in the same line shall be constructed. The author has added another to his many writings that are deemed classical.

T. G. A.

I. Résection Totale et Bilatérale du Sympathique Cervical dans le Traitement du Goitre Exophthalmique et de l'Epilepsie.

II. L'Hemicraniectomie Temporaire.

III. La Réduction Brusque des Gibbosités Pottiques.

IV. La Splénectomie.

V. De la Néphropéxie. Description d'un Nouveau Procédé Opératoire.

VI. Nouveaux Procédés pour la cure Radicale des Hernies Inguinales.

These are the titles of six reprints presented to the Twelfth International Medical Congress in Moscow by Prof. Thomas Jonnesco, of Bucharest. They indicate great activity and great boldness. Whether there is also combined with these two excellent characteristics that rather critical judgment which, while it does not reject a thing because it is new, does not necessarily accept it as true because it is new, is possibly a question.

Following the lead of Alexander, of Liverpool, who resected the superior sympathetic ganglion in the neck, Jonnesco has advocated the total bilateral resection of the cervical sympathetic, not only including the superior, but also and especially the inferior and, if it exists, the middle ganglion and the connecting nerve filaments, for both epilepsy and exophthalmic goitre. In Chipault's *Travaux de Neurologie Chirur-*

gicale for the present year will be found a very elaborate description of his operative procedure, with a number of cuts of specimens showing how complete his resections are. In that paper he has promised to give to the profession his results in detail. The present paper does not give the results in such a form that one can pass critical judgment upon them. The only statement is that he "has operated on twenty-six epileptics and that the therapeutical results have been excellent." In some cases the cure has been maintained for more than a year; others have been markedly ameliorated; always the attacks have become less frequent and less intense; none of them has been aggravated. We confess that it would be more satisfactory to surgeons if details of each case could be given, especially after a considerable time has elapsed.

No less bold is the second paper, on temporary hemicraniectomy, which, however, ought to be called hemicraniotomy. In this procedure he has followed a very able and also bold surgeon, Doyen, of Rheims, who also has a paper on the subject in the same volume of Chipault's *Travaux de Neurologie Chirurgicale.* Jonnesco gives the results in six cases in which he has turned down literally about one-half the skull; usually only upon one side, but in one case on both sides. The bilateral case got well. Of the other six, one died and five got well, a surprising result after so extensive an operation; but we cannot see from the records that they were very much better. The operations were done for epilepsy, microcephalus, and idiocy.

The third paper is in advocacy of Chipault's and Calot's recent method of the sudden reduction at a single sitting of the deformity from Pott's disease. The paper refers to thirteen cases, in which he has done it with certain modifications of the process. Apparently no ill effect has followed. It is, however, in our opinion, by no means a well-decided question that it is a wise procedure. The pictures showing in each a poor little "kid" stretched out on a table, surrounded by five, six, or seven men with pulleys applied to the head and the hips, followed by enveloping the whole body in plaster-of-Paris, certainly excite our sympathy.

The splenectomy paper reports twelve cases; eleven for enlarged malarial spleen and one for a hydatid cyst. Some illustrations are given, showing patients before and after operation, and a number of the spleens are figured. Of the twelve cases nine got well, and apparently their general health was not seriously worse from the loss of the spleen.

The paper on nephropexy describes the operative measure of laying bare the kidney, division of its capsule, and then sewing it and the capsule to the periosteum of the eleventh or twelfth rib. The reviewer can only add that in a considerable number of cases he has done the operation by simply passing sutures through the kidney without such elaborate technique, and has obtained good results.

The last paper describes a modification of Bassini's operation.

W. W. K.

ATLAS AND ESSENTIALS OF GYNECOLOGY. By DR. OSCAR SCHAEFFER, Privat-docent in Obstetrics and Gynecology at the University of Heidelberg. With 173 colored-plate illustrations and 54 wood-cuts. Pp. xviii. 288. New York: William Wood & Company, 1897.

THIS is the concluding volume of a series of five translations from the German by gentlemen whose names do not appear—a peculiarity of this publishing-house. We have always held that when a translator does good work he should at least have the satisfaction of placing his name on the title-page. But this is merely a matter of opinion. To the reader who is familiar with the originals, the colored plates will appear much above the average; in fact, they are quite pleasing to the eye. The translation of the text is above criticism; the condensed style of the author is preserved without the sacrifice of readable English. While the descriptions of operations are of little practical value, the paragraphs on symptomatology and diagnosis are sufficiently comprehensive. The arrangement is original, though convenient. Part I., on Fœtal Malformations, is followed by Part II. (two chapters), on changes in shape and position. Part III. treats of Inflammations and Trophic Disturbances; Part IV. of Injuries and their Sequelæ, including the various forms of fistulæ. Part V., on Neoplasms (three chapters), is fully illustrated by Plates 41 to 59, those depicting the different varieties of malignant disease of the uterus being most valuable.

This book will be particularly useful to the student and general practitioner, and ought to have a wide circulation. H. C. C.

KING'S COLLEGE HOSPITAL REPORTS, VOL. III. Edited by NESTOR TIRARD, M.D., F.R.C.P.; W. WATSON CHEYNE, F.R.C.S., F.R.S.; JOHN PHILLIPS, M.A., M.D., F.R.C.P., and W. D. HALLIBURTON, M.D., F.R.S.

THIS volume contains eight medical and surgical papers, and some two hundred pages of reports from the different services of the hospital, notes of cases, descriptions of specimens, etc. The special features of this volume are the picture and memorial sketch of the late Sir George Johnson and a description of a new ophthalmological theatre erected and equipped in his memory.

This building includes several new features, the working of which will be watched with interest. The wall is lined with opalite, an opal crown glass, with a face like that of ordinary crown glass, and the back roughened by fusing into it irregular fragments of glass, by which it is fixed to the walls and ceiling. The floor of the room extends some distance under the windows, so that the patient's feet can be thrust into this space and his head brought close to the window as he lies in bed prepared for operation.

Another feature is a closet for keeping the instruments and dressings, the front and back of which are of plate glass, so that everything is kept in strong sunlight, with arrangements for keeping dressings and solutions properly warmed and constantly ready for use.

A considerable part of the matter is of interest only to former graduates of the medical school, as the account of "What Old King's Men are Doing," and even an athletic record of the foot-ball club. In paper, printing, and binding the volume compares favorably with other hospital reports. E. J.

PROGRESS

OF

MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

REYNOLD W. WILCOX, M.D., LL.D.,

PROFESSOR OF MEDICINE AND THERAPEUTICS AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL; VISITING PHYSICIAN TO ST. MARK'S HOSPITAL.

Paraldehyde Delirium Tremens.—DR. G. REINHOLD reports a single instance of this rare condition. A man, forty-one years of age, was taking two ounces of this drug each day. He could stand with difficulty, and although his intelligence was not impaired, his speech was labored, and words were delivered in syllables in order to improve this deficiency. His nutrition was enfeebled, skin pale, and brow covered with perspiration. The eyeballs were deeply sunken, without disturbance of motion, and his look was fixed. The pupils were in mid-dilatation, but reacted well to light. There were no painful points on head or spine. There was marked tremor of hands and tongue, which was coated. Spinal innervation was unchanged. The lungs showed marked emphysema; the apex-beat was absent; the heart-sounds muffled; the pulmonic second sound accentuated; the pulse slightly irregular, ninety to the minute, and moderately full. The abdomen was retracted. The urine was very acid, contained a large quantity of urates, of a specific gravity of 1030, but free from albumin and sugar. The patient was sleepless, became delirious, had ideas of persecution and hallucinations, but improved under sodium bromide and trional, and finally was discharged after sixteen days of observation.—*Therapeutische Monatshefte*, 1897, Heft 6, S. 300.

Treatment of Alcoholism.—DR. N. S. DAVIS believes that (1) the patient should be instructed in regard to deceptive and injurious influences of alcoholic drinks, so that he is actually convinced that their use is, on all occasions, unnecessary. (2) The patient should be placed under good physical and social surroundings. For impaired digestion, irritable nervous system, and disturbed sleep, one-sixtieth of a grain of digitalin with one-thirtieth of a grain of strychnine at each meal, with from twenty to thirty minims of diluted hydrobromic acid at bedtime, will give excellent results. For con-

stipation, thirty minims of fluid extract of rhamnus purshiana may be added to the acid. Instead of the digitalis and strychnine, a pill or capsule of a grain of extract of hyoscyamus, with three grains of cerium oxalate, may be given. Before an anticipated period of dissipation a pill of two grains of quinine sulphate, the same amount of extract of eucalyptus globulus, and one-third of a grain of extract of cannabis indica should be given with each meal for two weeks. (3) The patient should be separated from his associates, and if this cannot be done in any other way, he should reside in a well-regulated asylum for six to twelve months.—*Quarterly Journal of Inebriety*, 1897, No. 2, p. 162.

Nicotine.—Dr. J. W. Seaver cites various authorities giving the effect of this drug upon the nervous and muscular systems, the alimentary tract, glandular activity, and the blood. Dividing a class in college into three groups: (1) non-users of tobacco in any form, (2) those who have used it regularly for at least a year, and (3) the irregular users, he finds that the first group grows in weight 10.4 per cent. more than the second and 6.6 per cent. more than the third. In height the first group grows 24 per cent. more than the second and 11 per cent. more than the third. In girth of chest the first group grows 26.7 per cent. more than the second and 22 per cent. more than the third. In lung-capacity the first group gains 77 per cent. more than the second and 49.5 per cent. more than the third. Among students of the highest scholarship about 5 per cent. use tobacco, while of those who do not obtain college appointments over 60 per cent. use tobacco.—*Quarterly Journal of Inebriety*, 1897, No. 2, p. 132.

Cinchonism.—Dr. Pierre Sillan reports a single instance. A woman, forty-five years of age, became delirious after taking quinine sulphate, three and three-quarter grains every four hours for thirty hours. The limbs were trembling, but not rigid, pupils contracted, temperature normal, and the pulse eighty and respiration forty to the minute. There had been suppression of urine for nine hours. A tablespoonful, withdrawn by catheter, was thick and high colored, but not otherwise abnormal. Excessive headache and tinnitus aurium were complained of. Later there was vomiting. The symptoms were relieved by potassium bromide and chloral, fifteen grains of each dissolved in camphor-water, of which two doses were given at an hour's interval.—*Therapeutic Gazette*, 1897, No. 7, p. 502.

Rhus-poisoning.—Dr. Joseph H. Hunt recommends the yellow wash (lotio hydrargyri flava, B. P.; corrosive mercuric chloride, 1; lime-water, 243), used in full strength, continuously applied by means of a cloth wet with the lotion, as soon as irritation is recognized. It may not prevent vesication, but it is cooling, and will subdue much of the inflammation. After the acute symptoms subside an emollient ointment should be used. For the febrile condition aconite or gelsemium and quinine may be employed. —*Brooklyn Medical Journal*, 1897, No. 6, p. 392.

Treatment of Snake-bites.—Dr. Corislano d'Utra, from a large experience in Brazil, neutralizes the poison, even when it is in the circulation, as is

shown by abundant hemorrhage, deafness, blindness, vertigo, nausea, and almost imperceptible heart-beats, by giving thirty grains of calomel in an ounce of lemon-juice, and repeating this every two hours. After the third dose the patient is out of danger. Of more than one hundred patients, none have died. An infallible preventive is the carrying of one to five drachms of sublimate attached to some portion of the body, which either causes the snake to flee, or should it bite it is harmless. This note was presented by the author in addition to the statements of Fraser as to the properties and curative influence of antivenene.—*Bulletin Général de Thérapeutique*, 1897, 8e liv. p. 368.

The Cutaneous Absorption of Iodine.—MM. LINOSSIER and LANNOIS conclude from their experiments that (1) iodine applied by painting is absorbed by the skin. This absorption, very small when the painted part is exposed to the air, becomes much more active when it is hermetically covered. The maximum of absorption takes place at the time of the application. (2) The superficial alteration of the epidermis produced by the tincture of iodine, provided it does not go on to destruction of the corneous layer, appears to be an obstacle rather than an aid to absorption. Under the most favorable conditions the absorption is too irregular to make the painting of iodine useful in general iodine medication. (3) Iodoform and ethyl iodide are absorbed by the healthy skin, the latter in sufficient quantity to be useful, if needful, for a general iodine treatment.—*Bulletin Général de Thérapeutique*, 1897, 9e liv. p. 385.

Eucaine.—DR. G. SCOGNAMIGLIO presents a very excellent report which embodies the observations of previous experimenters. He shows conclusively that it is less toxic than cocaine, and that the resulting anæsthesia is as rapid, complete, and intense as that of the latter drug, and is diffused through a larger area. His general conclusion is that it is a better and cheaper local anæsthetic.—*L'Nuovi Remedii*, 1897, fasc. 1–3, pp. 3, 18.

DR. E. T. MELLISH states that this drug is chemically compatible with the following substances: Phenol, trikresol, guaiacol, naphtol, salol, ichthyol, formalin, iodoform, such hydrocarbons as petroleum, vaselin, benzene, fats and fatty oils, ethereal oils, camphor and terpenes, alcohol, glycerin, ether, chloroform, chloral, alkaloids, and alkaloidal bodies. It can be sterilized by heat, and appears to be permanent in solution.—*The Therapist*, 1897, No. 5, p. 49.

Treatment of Sciatica.—DR. ALBERT ROBIN calls especial attention to the use of hypodermatic injections of sodium glycerophosphate, 1, in distilled water, 4. As alternatives he offers the following formulæ: 1. Calcium, magnesium, and potassium glycerophosphates, of each, .04; sodium glycerophosphate, 13; and (2) iron glycerophosphate, .05; calcium, magnesium, and potassium glycerophosphate, of each .08. Of the three formulas he prefers the first, which is less irritating. The others are more active, but cause marked pain. He generally commences with twelve minims, which is usually sufficient; if necessary, doubling the dose. The solutions should be prepared in small quantities as needed, but can be preserved in small, sterilized bottles,

each containing a single dose. All aseptic precautions should be observed, and the injections should be made deeply *in loco dolenti* and successively along the course of the nerve, so far as it is painful. The pain may not yield after the first nor the second, but will after a series of injections. The cure is usually complete and persistent.—*Bulletin Général de Thérapeutique*, 1897, 10e liv. p. 433.

Treatment of Acne.—Dr. S. Ehrmann, after mentioning various remedial measures intended to improve the general conditions, recommends the following formula: Resorcin, 3; adeps lanæ hydrosi, 15; ointment, 5, which is of thick consistence, and should be left in place for fifteen hours. In the interval washing is allowed, but only with mild soap. Besides this ointment systematic opening of the pustules should be carried out, and when opened the cavity should be treated with a small drop of a 20 per cent. solution of carbolic acid in alcohol.—*Therapeutische Wochenschrift*, 1897, No. 19, S. 457.

The Waters of Bourbon-l'Archambault.—Drs. Rigal and Pourrat report the results of their observations as follows: The water flows at a temperature of 125° F., and contains about one-sixth of its volume of carbon dioxide and 4.42 per cent. of fixed residue. Of the latter, 2.34 per cent. is chlorides, 1.34 per cent. bicarbonates, with silicates, sulphates, and iron oxide in small quantities. The waters are harmful for marked tuberculous lesions, but of manifest utility for rheumatism in all its forms, even when complicated by heart-lesions. Neuralgia and especially sciatica are generally cured. They are useful in lesions consecutive to fractures and dislocations. They have some influence upon the pains of tabes dorsalis. They are certainly useful in peripheral neuritis, paralysis, and hemiplegia. Baths and douches are the methods employed in the treatment of the above-mentioned conditions.—*Archives de Médecine et de Pharmacie Militaires*, 1897, No. 6, p. 339.

The Action of Phosphorus in Chlorosis and Anæmia.—Dr. Angelo Casati notes that failures in the use of iron are frequently met with in these conditions, and these appear to be dependent upon the absolute loss of appetite. The restoration of the appetite is brought about by phosphorus, and then sufficient iron can be absorbed in form of the ordinary medicinal preparations or in the foods which contain iron, as meat, eggs, lentils, and red wine. The best method of administering the remedy is as the phosphorated oil in gelatin capsule, each containing one sixty-fourth of a grain of the drug. The treatment is begun by giving one capsule each day, and every second day increasing by one capsule until five are taken each day. Then the dose is diminished in the same way until the initial dose of one capsule is reached. If the appetite is not permanently benefited after ten days, the treatment is repeated.—*Gazzetta degli Ospedali*, 1897, No. 4, p. 37.

Treatment of Palpitation.—Dr. Henri Huchard treats this symptom according to its cause. The palpitation of toxic origin (coffee, tobacco) or from drugs (quinine) disappears when the cause is removed. If it is of gastro-intestinal origin and generally nocturnal, due to dyspepsia, with excess of hydrochloric acid, alkalies in sufficient dose and regulation of diet

are necessary. Iron does not produce palpitation unless in consequence of its intemperate administration, as in dyspeptic chlorosis it produces or accentuates a drug gastropathy. Since it is true that there is no part of the body which may not be the cause of cardiac palpitation, it is necessary to investigate all possible causes before attributing a lesion to the heart. Of these lesions which are accompanied by palpitation (acute aortitis at its commencement, acute endocarditis and pericarditis, pericardial adhesions, obstruction or insufficiency at the mitral valve), the symptoms of cardiac erethism are benefited by a pill of one and one-half grains of quinine hydrobromate, three-fourths of a grain each of powdered digitalis and extract of convallaria, twice to four times daily.—*Revue Général de Clinique et de Thérapeutique*, 1897, No. 18, p. 276.

Commelina.—Mr. Alfonso Herrera has made a chemical analysis of this Mexican plant. In the extract was found a proteid principle and potassium chloride, which apparently possesses hæmostatic properties. The theory of action suggested is that the proteid principle of the plant mixed with the effused blood, whose alkali reacts upon the former, affords a separation of ammonia, which contracts the bloodvessels; the potassium chloride contained adds its action to that of the ammonia. The drug is used in the treatment of menorrhagia and hæmoptysis, as an active remedy in leucorrhœa, and as a general hæmostatic in capillary hemorrhage. The extract is given as a pill of one or two grains, of which twenty-four to forty-eight each day are taken. Injections are of the strength of from 1 to 16 to 128.—*American Journal of Pharmacy*, 1897, No. 6, p. 290.

The Influence of Morphine Upon Hydrochloric Acid of the Stomach.—Dr. F. K. Kleine shows, from experiments on dogs, that morphine markedly delays gastric digestion, and when continued diminishes the secretion of hydrochloric acid. The facts are independent of each other, for we may find after ten days a large secretion, while the digestion was severely affected on the fourth day. The latter may be explained on account of the motor paralysis of the stomach, which secondarily affects the mucous membrane by the fermentation which is set up. If this condition is lasting, then the hydrochloric-acid secretion gradually diminishes, and in long-continued morphinismus ceases. If the drug is stopped and the mucous membrane restored to health, the secretion of acid commences and increases gradually. —*Deutsche Medicinische Wochenschrift*, 1897, No. 21, S. 321.

Absorption of Iron.—Dr. R. Lépine cites many observations which prove that iron, when administered hypodermatically, is absorbed. He then reports an instance of the hypodermatic administration of a daily dose of two to two and one-half grains daily of iron citrate in a 4 per cent. aqueous solution. The improvement was rapid. The treatment was well borne, probably because the percentage of the solution employed was low.—*La Semaine Medicale*, 1897, No. 25, p. 197.

Treatment of Severe Dysentery.—MM. F. J. Bosc and V. Vedel recommend the use of intravenous injections of salt-water, reporting four instances

of their use. They conclude: 1. Large injections (40 to 60 ounces) of sodium chloride, seven *per mille*, constitute an energetic treatment. 2. They should be made early and repeated, so that they will develop sustained general reaction and a modification of the general condition which can lead to recovery. Three of the four patients treated survived, although all appeared to be hopeless; the fourth, although *in extremis*, lived longer and was brought into better condition through this treatment. 3. There are no contraindications to this treatment, but care should be taken as to the quantity used and the rapidity with which it is injected. Too large injections are dangerous, and from one and one-half to three ounces each minute should not be exceeded.—*La Presse Médicale*, 1897, No. 51, p. 288.

Quinine in Uterine Inertia.—Dr. H. A. Hare, in summing up the results of answers to inquiries addressed to eight prominent obstetricians, concludes that it is not a first-rate uterine stimulant, and that for this reason its ordinary contraindications are so great as to limit its oxytocic usefulness. It evidently only acts as a stimulant to the general system, as would alcohol or other drugs of similar stimulant power.—*Therapeutic Gazette*, 1897, No. 7, p. 433.

Treatment of Syphilis by Intramuscular Injections of Corrosive Mercuric Chloride.—Dr. Cartier makes use of the following formula: Corrosive mercuric chloride, 1; sodium chloride, 3; distilled water, 20; in dose of nearly one grain of the drug, which is injected into the retro-trochanteric region. This has not caused even the smallest abscess, although severe pain may occasionally be met with. Intramuscular injection should be the treatment of choice in that there is introduced into the organism a known amount of the drug in a condition to be fully utilized. The syphilitic manifestations yield rapidly, not only in severe cases, but in facial manifestations. The injections should be repeated every eight days, exceptionally in five, and four injections are sufficient to relieve the patient of contagious lesions, and six or eight for serious cases—those refractory to ordinary treatment or under unfavorable hygienic conditions.—*Revue de Thérapeutique Médico-Chirurgicale*, 1897, No. 11, p. 361.

Hæmato-catharsis in Broncho-pneumonia.—Dr. E. Houél reports a single instance of the successful use of this method in a child, aged six months. Four ounces of a seven *per mille* solution of pure sodium chloride in boiled distilled water, under antiseptic precautions, were slowly injected in the scapular region. The following are offered for consideration: 1. Subcutaneous injections of artificial serum, slowly made, are not contraindicated in pulmonary disease. 2. Age is not a contraindication. 3. Given at an early period of the disease, they increase the chances of cure; they are useful even in the last stages. 4. They seem to determine a crisis such as normally occurs (polyuria, diarrhœa, sweating, and amelioration of symptoms) with defervescence. 5. The administration is possible for rural physicians so long as the syringe can be sterilized. 6. It is important that asepsis should be obtained, so that there may be no recrudescence of the fever from septicæmia or abscess from septic hands. 7. If this method is employed *in*

extremis, it is likely that so good results will be obtained that physicians will not wait until the patient is *in articulo mortis*.—*Revue de Thérapeutique Médico-Chirurgicale*, 1897, No. 11, p. 357.

The Use of Hydrastis Canadensis in Bronchial Catarrh.—Dr. M. Saenger has found that in the early stages of acute attacks the remedy is useless, but so soon as the expectoration loses its mucous character and becomes muco-purulent or purulent it is of great value. In these cases it markedly diminishes the inclination to cough, lessens the expectoration, renders it less consistent, and aids it to return to its mucous character. The physical signs are also improved after the administration of the drug. The bronchial irritation is more promptly removed than by opium, and with no unpleasant after-effects. The modification of the expectoration is at least equal to that produced by other expectorants, and as an anticatarrhal remedy it is superior. The fluid extract is preferred in from twenty- to thirty-drop doses, four times daily, in sweetened water.—*Centralblatt für innere Medicin*, 1897, No. 17, S. 401.

Treatment of Catarrhal Diseases by Guaiacol Carbonate.—Dr. Nied has treated twelve adult female patients, in age from twenty-three to seventy-five years. Some of these suffered from acute bronchitis and others from influenza. The dose varied from seven to thirty grains, twice daily. The effects were seen generally upon the second, latest upon the fourth day. The appetite returned, and then commenced an abundant expectoration of mucus, which ceased within fourteen to twenty days. The patients were discharged as cured in two or three weeks. Besides these six nuns were treated, two of the ages of seventy-nine and eighty-one, who received fifteen grains of the drug twice daily for three weeks. Beneficial results were noted upon the third day. These very favorable results should encourage a further trial of the drug in acute bronchitis and other catarrhal diseases.—*Allgemeine Wiener Medicinische Zeitung*, 1897, No. 22, S. 244.

Nascent Ammonium Chloride in Pneumonia.—Dr. John Ashburton Cutter reports a single instance of the use of this remedy, which was generated by shaking together two cloths, the one wet with strong ammonia and the other with commercial hydrochloric acid; the nascent ammonium chloride then appeared, like smoke, in the room, and was inhaled. The author believes that this substance is a germicide, and therefore destroys the parasites of the disease; the free ammonia is a tonic and stimulant to the lungs, the acid supplies the deficiency of chloride, and, finally, this method does not disturb the patient.—*Albany Medical Annals*, 1897, No. 7, p. 360.

Treatment of Gonorrhœa by Injections of Argonin.—Dr. H. M. Christian recognizes two conditions which are present: (1) The gonococcus, the exciting cause; and (2) the catarrhal inflammation of the mucous membrane resulting from destructive action of the gonococcus upon the epithelium; both must be considered in order to insure success. From the use of this remedy in eighty acute and ten chronic cases he concludes: 1. That it is absolutely unirritating, and can be used in from 1 to 10 per cent. solutions.

2. In the great majority of cases it very rapidly lessens the discharge. 3. The gonococci disappear after a short period. 4. This disappearance is not in all cases permanent; there is in quite a large proportion of cases a tendency to relapse with reappearance of the gonococci. 5. It possesses a distinct value as a hand-injection in the stationary period of the disease, but is of very little benefit in the mucous stage or stage of decline. 6. It produces no results in the treatment of chronic anterior urethritis.—*Therapeutic Gazette*, 1897, No. 7, p. 447.

Plant-dialysates.—Dr. A. Jaquet collects green plants in good weather, contuses and places them in the apparatus for fourteen days, first with water and next with diluted alcohol. Chemical analysis shows that the dialysate contains a definite percentage of the active principles of the plants. He has tested two specimens of belladonna and aconite and one each of veratrum, digitalis, and adonis, by physiological methods, and finds them advantageous for accurate dosage.—*Correspondenz-Blatt für Schweizer Aerzte*, 1897, No. 11, S. 326.

Formaldehyde Gas.—Dr. H. C. Wood states that the chief interest in this drug centres in its powers as a germicide and disinfectant. As a gas it will penetrate not only animal tissues, but almost all organic substances, so that books infected with various pathogenetic germs could be disinfected by being shut up for fifteen minutes in an atmosphere containing the vapor of commercial formalin (40 per cent. aqueous solution of formaldehyde), one part to three hundred of air. The method of Trillat is the preferable one, and consists in the use of the formaldehyde directly after its production by the passage of the vapors of methylic alcohol over red-hot metal. Kinyoun has shown that none of the ordinary fabrics are injured by the gas, which is capable of completely disinfecting curtains, carpets, clothing, bed-covering, and the minor forms of furniture, although it is doubtful whether heavy upholstered furniture, such as sofas and mattresses, can, in their interior, be thoroughly disinfected. The gas is so irritating that no one can remain in the room during the disinfection, but the lamp employed is automatic and can be left to itself. It can also be used for the removal of foul odors; ½ to 1 per cent. solution is sufficient for cleansing vessels in the anatomical laboratory. If the hands be washed with it and afterward with alcohol, they are rendered completely antiseptic, but are not stained or irritated. It does not affect instruments, and it is efficient in preparing catgut and surgical dressings. For the cleansing of an infected wound a 2 per cent. solution is used, but for a continuous local application or free irrigation, one-fourth of 1 per cent. is sufficient.—*University Medical Magazine*, 1897, No. 9, p. 605.

Tribromophenol Bismuth.—Dr. Hugo Fink prefers this antiseptic and desiccant to iodoform for all purposes for which he formerly used the latter drug. There are no unpleasant after-symptoms, as eczema or dermatitis, the discharges lose their odor and lessen in quantity, and wounds heal rapidly with a flexible cicatrix. There is no odor, nor do exuberant granulations form.—*Wiener klinischer Rundschau*, 1897, No. 20, S. 331.

MEDICINE.

UNDER THE CHARGE OF

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Acute Yellow Atrophy of the Liver, with Changes in the Spinal Cord.—Much interest attaches to changes in the cord in diseases depending upon a general intoxication. GOLDSCHEIDER and MOXTER (*Fortschritte der Medicin*, 1897, No. 14) report the following: Female, aged eighteen years. Syphilitic lesion three months ago. Entered the hospital on account of increasing weakness and drowsiness. The patient was of small size, icteric, liver increased and very tender. Later the liver became smaller in size, then jaundice became very intense, and at the end of three months the patient died in coma. At the autopsy there were small hemorrhages in the peritoneum, the spleen was enlarged, the kidneys swollen, the liver weighed 840 grammes. The dura was stained yellow; arachnoids reddened. Microscopically, marked interstitial increase in the liver; the parenchyma in part gone. Complete fatty degeneration of the kidneys. Throughout the entire length of the cord the neuroglia elements, especially about the vessels, were increased in size, but not in number. The parenchyma showed occasional diffusely distributed swollen axis-cylinders and localized patches of degeneration, especially marked in the cervical region. No change in the anterior or posterior roots. The vessels were intact. It is to be noted that the parenchyma changes were limited to the terminal parts of the end arteries, and that the glia changes were qualitative and not quantitative, as shown by the lack of any increase in the number of nuclei. These changes, the author thinks, are toxic. They correspond very nearly to those found in fatal anæmias. In some of the areas shown to be degenerate by the bright yellow color given by the potassium bichromate no microscopical changes could be found. This is explained by saying that in their earlier stages the changes were only chemical, and were brought out by the reagent. This case shows that in acute yellow atrophy the cord may show changes which seem to be, like the atrophy of the liver, the result of the severe general intoxication. The precise nature of the poison remains in doubt, but the changes in this case were unquestionably due in some way to the syphilis.

The Narrow Aorta.—SUTER (*Archiv für Experimentelle Pathologie und Pharmakologie*, vol. xxxix. Nos. 3 and 4) has undertaken the measurements of the aorta in a large number of cases, with a view of determining if any relation exists between the narrow aorta and certain forms of anæmia in which there are subjective symptoms without blood-changes. While he

fails to find any such relation, his results are interesting in connection with the "narrow aorta" of Rokitansky and Virchow. Suter has gone thoroughly into the question, and in his tables has taken into account age, sex, and size of the individuals. He has measured the aorta in 2719 cases and tested the elasticity of its wall in 105. He concludes in part as follows:

1. The size of the aorta varies with age and sex, and in those of the same sex with the size of the individual.

2. It is not true that those who die of puerperal fever, typhoid, carcinoma, or phthisis have narrow or wide aortas.

3. The power of contracting when the blood-pressure is removed—*i. e.*, the elasticity of the organ—decreases with age.

4. There is no such thing as the narrow aorta in the sense of Rokitansky and Virchow. The size of the organ in the cadaver does not correspond to its size in life, and measurements from the autopsy chamber cannot be substituted for them.

Case of Fatal Potassium Chlorate Poisoning.—JACOB (*Berliner klinische Wochenschrift*, 1897, No. 27) reports the following case: A seamstress, aged thirty-nine years, was admitted in an almost comatose condition; face was ashy, lips, fingers, and ears cyanotic; tongue blue-black; blue and copper-colored spots on the temples; marked dyspnœa, thready pulse. The patella tendon reflexes absent. During the four days of the patient's life there was almost complete anuria, from 25 to 50 c.c. being passed daily. The characteristic methæmoglobin bands were plainly seen. Many corpuscles were present at first; later they diminshed, but at the end the urine contained methæmoglobin, hæmoglobin, and traces of hæmatin. On the third day there was pain in both hypochondria, without enlargement of the liver or spleen. The patient died suddenly on the fourth day. On entrance the blood-count showed 4,425,000 red corpuscles and 84,000 whites. The second day the reds had sunk to 1,825,000, and the whites sank steadily to about normal before death. On the first day no very marked changes could be seen in the erythrocytes. On the following day normally colored reds were scarcely to be found, and many shadows, in part arranged in rouleaux, were present. There were, too, many fragments of red corpuscles, partly free and partly contained in the corpuscles, in the form of spheres. These forms increased so that finally there were large masses of débris. The white cells were often filled with the disintegrated reds. The stained covers were not so striking; the whites, however, looked swollen and had pale nuclei. The stained reds were so irregularly stained that many seemed to be colorless and to contain granules. Toward the end the preparations looked like poorly fixed covers. The author's finding agrees generally with that of others. He differs, however, from Riess in thinking that the increase in the white cells may be a reaction-leucocytosis. The author claims that potassium chlorate is a dangerous drug and that its use should be restricted, especially in pediatric practice.

Relation of Albumosuria to Fever.—SCHULTESS (*Deutsches Archiv für klinische Medicin*, vol. lviii. Nos. 4 and 5) has endeavored to solve the problem of the relation of albumosuria to fever by finding out how often albumose occurs in the urine of patients with fever and how frequent is its occurrence

in those with no fever. He thinks that 75 per cent. of the cases of albumosuria in the literature had fever; and although such figures are only to be received with caution, they point to a connection between the two. In the author's own work urines containing albumin were carefully excluded. After the reaction was determined any mucin or nucleo-albumin was removed by acetic acid; the filtrate was then carefully tested for albumin. If none was found, 25 to 30 c.c. were mixed with five to six volumes of absolute alcohol, stirred, and allowed to stand for twenty-four hours, filtered, the precipitate dissolved in warm water, and the filtrate again tested for nucleo-albumin, and with the biuret reaction. Of fifty-six cases with non-febrile disease, forty-three, or 77 per cent., had no albumose. In the fifty-nine cases with febrile diseases, 90 per cent. had albumose. The acute infectious fevers, as scarlet, diphtheria, typhoid, were especially noteworthy. In these the albumose curve coincided very nearly with that of the fever.

The Excretion of Lepra Bacilli.—WEBER (*Deutsches Archiv für klinische Medicin*, vol. lviii. Nos. 4 and 5).—The appearance of several sporadic cases of leprosy has lately given a new interest to the question of the manner of the spread of this disease. Experiments to prove the contagious nature of the disease have so far been contradictory. If leprosy is really contagious and caused by Hansen's bacillus, the bacillus must leave the body in such a way that it can be transferred to others. To find in what way the germ does leave the body the author has examined, by the Ziehl-Nielsen method, all the secretions, the blood and tissue-fluids, the skin, scales, and hair. Bacilli were found in blood from the diseased tissue, in vesicles from the diseased tissue, in scales from the skin, in lanugo hairs, in sweat, and in semen.

From the above it is clear that the germs are excreted in various ways. Whether they are in a condition to cause leprôsy anew has not yet been definitely shown.

Experiments with the Modern Treatment of Prostatic Hypertrophy.—CASPAR (*Berliner klinische Wochenschrift*, 1897, No. 27) discusses the effects which modern methods of treatment—castration, tying the vasa, and feeding with the gland-substance—have upon prostatic hypertrophy, and has tried to throw some light upon the question by experimenting upon animals. We know nothing about enlarged prostates in animals. The important thing is to bring about a reduction in the size of the gland, whether at the expense of the normal or pathological tissue is of no consequence. For the reason that enlarged human prostates always contain normal tissue, experiments upon normal glands will be of value. One may assume that the prostate bears the same relation to the genitals in men as in the lower animals. Experiments done so far have for the most part shown that castration is followed by atrophy of the prostate gland. Animals for experimental purposes must be chosen with the greatest care, as the structure and size of the prostate vary with age. The author experimented upon twenty-one dogs and rabbits, and found that double castration always caused atrophy of the prostate. Bilateral excision of the vasa deferentia had once a similar, although more delayed, result. In two other cases, however, no atrophy was to be found. The tying of the vas had no effect upon the testis during the four months the animals were

observed. Unilateral castration, unilateral vasectomy, and feeding the gland-substance had no influence whatever upon the prostate. Caspar disagrees with Sakur, who claims that with the loss of the testis-function something is withdrawn from the system that is necessary to the maintenance of the prostate. As agreeing with experimental and clinical facts, he adopts the view of Pezewalski, who holds that the division of the nerves of Cowper which accompany the vasa brings about an atrophy of the prostate, but not of the testis. The author declines to draw any practical conclusions from his experiments, and thinks it is too early for any accurate deductions from the clinical material so far at hand.

Cholecystitis Typhosa.—VON DUNGERN (*Münchener medicinische Wochenschrift*, No. 26, 1897) has been able to find four cases of cholecystitis in which the Eberth bacillus could be shown to be the cause. To these he adds the following: A woman, aged forty-six years, had typhoid fever in 1882; in 1887 she began to have severe attacks of cardialgia with vomiting. The same trouble recurred again the next year, and again in 1889, this time with icterus. No symptoms in 1895, when there was a periostitis of the lower jaw with necrosis. In October, 1896, there was colic, and in the region of the gall-bladder a tumor the size of a child's head, which proved to be an abscess connecting with the gall-bladder. The pus contained typhoid bacilli in pure culture. The blood-serum of the patient was very active, causing a complete Widal reaction in a dilution of 1 to 80, although the patient had had no typhoid for fourteen years. The author thinks it most likely that the bacilli entered the gall-bladder during the typhoid fever fourteen and a half years ago, and remained entirely latent for five years, causing the various attacks since.

It is possible that the primary affection may have been gall-stones, and that the gall-bladder was secondarily infected, forming a "liver typhoid," which did not involve the intestine because the germs were of low virulence and because the patient had an increased resistance due to the previous typhoid.

Etiology of Multiple Sclerosis.—BLUMREICH and JACOBY (*Deutsche medicinische Wochenschrift*, No. 28, 1897) have studied the histories of the cases of multiple sclerosis in Gerhardt's clinic, with especial reference to trauma as an etiological factor in this affection. In all twenty-nine cases were analyzed; twenty-three were men and six women. The fact that several times the affection began in childhood serves to bear out the theory of Ziegler, that multiple sclerosis arises upon the basis of a congenital disposition. Many of the cases had had infectious diseases; in only one, however (influenza), could any connection be made out between it and the onset of the multiple sclerosis. There was but one undoubted syphilitic. Six times there was a possibility of an intoxication, and two were alcoholics. All were carefully questioned as to trauma; eleven had been subjects of injuries. Five times the disease followed promptly upon the injury, in a sixth the multiple sclerosis followed at once upon the trauma; but this latter was due to a sudden dizziness. In the other five cases the trauma occurred a long time before the onset. Although the etiolgy of multiple sclerosis is not yet clear, the authors

think there can be no doubt that a relation exists between acute infections, intoxications and trauma. The trauma may cause the anatomical changes upon which the disease depends, or it may only occasion the breaking out of an already existing disease; again, it is possible that the trauma only plants the germ of the affection which may require a second influence to give it typical characters. On the other hand, it may be that the relation is the reverse, and that the giddiness and uncertain gait of the disease cause the trauma. A knowledge of the causes of multiple sclerosis willtbe of value in the way of prophylaxis and for treatment.

Roentgen Rays and Acute Dilatation of the Heart.—SCHOTT (*Deutsche medicinische Wochenschrift*, No. 31, 1897) in 1890 published a series of experiments showing that an acute dilatation of the heart could be caused by severe exercise. He was at that time obliged to depend entirely upon methods of physical diagnosis. Now he publishes a series in which the results of physical examination are corroborated by means of skiagraphs and diagrams from screens. The results showed that after exercise the heart was enlarged in all diameters, in one case as much 3.5 cm. laterally. The right ventricle not only showed the greatest increase in size, but its enlargement came on first and disappeared before that of the left ventricle. A bicycle ride of 5½ km. in twenty-three minutes caused a dilatation of 2 cm. in the right ventricle, and the apex to move outward 1½ cm.; a walk of 1½ km. in thirteen minutes, on the other hand, while causing a sweating as marked as the riding, brought about no increase in the size of the heart.

Anatomy of Gout.—RIEHL (*Wiener klinische Wochenschrift*, No. 34, 1897), opposing the view of Ebstein, says that in gout urate crystals are deposited in unaltered living tissues, and that the assumption that necrosis of the tissues must precede the deposit of the salts must be given up. Whether the tissue increase about the urate deposits is due to mechanical or chemical irritation is not yet clear. Gouty nodules are probably formed about as follows: First, a deposit of crystals in the lymph-spaces and vessels and in the connective tissue itself, due to this inflammation of the surrounding tissue with granulation tissue and giant cells. The author thinks that the failure of others to find urates in the healthy tissues is due in part to their having examined tissues from the cadaver, and in part to faulty methods of hardening.

Stomach Tetany and Autointoxication.—This affection is tolerably rare, about forty cases having been reported, of which not more than eleven are considered pure. The cause of the spasm is in doubt. The view that it is an intoxication has the most adherents, and is the one entertained by the author. If this theory is correct one would expect to find the poison in the stomach-contents and in the urine. GUMPRECHT (*Centralblatt für innere Medicin*, No. 24, 1897) has studied these secretions in a nineteen-year-old workman, who had dilatation from pyloric stenosis. The patient had typical tetany spasm lasting several hours and slowly disappearing through several days. The author reviews the literature of the subject and gives in detail the methods used in his own work. In conclusion, he says: "Neither

the stomach-contents nor an alcohol extract of it injected into animals had any toxic effect. A mixture of albumoses and salts, obtained by precipitating with alcohol, had pronounced toxic properties. These albumoses, however, could not have been absorbed, as they were not to be found in the urine of the patient. An autointoxication, therefore, could not be referred to them. The urine was twice as poisonous as normal urine; however, urine from the same patient at a time when he had no spasm was equally poisonous. It could not be determined what part of the effect was due to the urinary salts, because the ash was more toxic than the original urine. On the other hand, the virulence of a possible organic poison could not have been very great, for when injected into the portal vein only 7 per cent. more of the urine was required for a fatal effect than when it did not first go through the liver. In short, no poison was found at the time of the tetany that could be looked upon as a cause of an autointoxication.

Yellow Fever.—HAVELBERG (*Berliner klinische Wochenschrift*, Nos. 23–26, 1897) contributes the result of twenty-nine complete autopsies made at Rio Janeiro in the last two years. He has examined all the organs macroscopically and microscopically. He finds the changes usually described in the liver and spleen, but thinks none of them are characteristic of yellow fever. The very slight involvement of the spleen is very striking. There is no alteration in the relation of the red and white corpuscles. The blood contains bile before it is seen in the urine, but careful spectroscopic examination fails to show any trace of hæmoglobin in the blood-serum. A bacteriological examination of the stomach-contents revealed the presence of a bacillus that, after having once been recognized, he was able to find in every case. If 1 to 2 cm. of the stomach-contents of a patient with yellow fever is injected into a guinea-pig, the animal dies, and his blood contains a pure culture of the bacillus found in the stomach. The micro-organism in question is a very small, slender bacillus, about 1 μ long and from 0.3 to 0.5 μ wide. They grow, as a rule, singly. It is colored by all the basic aniline dyes, but not by Gram's stain. It grows upon gelatin plates as fine points in twenty-four hours. It is a facultative anaërobe, does not liquefy gelatin; 1 cm. of a bouillon culture kills guinea-pigs in twenty-four hours. The kidneys are reddened; the stomach is markedly injected, and sometimes there are small hemorrhages. The spleen is but slightly affected. Whether the animal is killed by an injection of the stomach-contents of a yellow-fever patient or the culture, the same germ is always found in the heart-blood in pure culture. The cultures are fatal to white mice. Rats are not very sensitive, and chickens are entirely immune. The filtrate from an old bouillon culture has no effect on guinea-pigs. Animals were able to take the cultures pure without injury if the mucous membranes were intact. The author has been able to protect animals from fatal doses of the germ by injections from patients with yellow fever. This, the author thinks, shows that we are dealing with the specific germ of yellow fever, and that we have a solid basis for a future serum therapy.

The Multiplicity of the Primary Lesion of Syphilis.—SACK (*Berl. klin. Wochenschr.*, 17 May, 1897) calls attention to the statement in Eichhorst's

Handbook of Special Pathology and Therapeutics, that a very characteristic point in the differential diagnosis between hard and soft chancres is that the former is "almost always" single and "very rarely" multiple. He believes that this statement is likely to mislead many, and particularly students, and reports an interesting case of his own in which there were as many as fifteen separate hard chancres on the genitalia. That multiple hard chancres are not so uncommon was shown in 1858 by Ricord, who published the statistics of Fournier and Clerc. The proportion of single to multiple hard chancres in Ricord's 456 cases of syphilis was 3 to 1; in Clerc's 267 cases, 5 to 1. The proportion in the cases of syphilis that have come under Sack's observation has been about the same as Clerc's, namely, 5 to 1. With the exception of two cases, one reported by Ricord and Fournier with nineteen, and the other by Mauriac with sixteen separate hard chancres, Sack's case presented the largest number of initial lesions yet recorded.

The patient, a man, aged twenty-two years, had had coitus eight days before he came under observation. Previous to coitus he had itching of the genitalia due to scabies, and remembered that at the time of connection he had a few small excoriations on the prepuce due to scratching. The increase of the itching and the appearance of several excoriations on the penis led the patient to consult Sack in Heidelberg. The patient, on first examination eight days after coitus, presented excoriations on the abdomen and genital region, the result of scratching. On the scrotum just to the left of the penis were two small abrasions of the skin. The dorsum of the penis and the border of the prepuce each presented two similar lesions. None of these, however, were to be differentiated from simple excoriations. There were five small abrasions at the coronal sulcus which were attributed to a balanitis.

The diagnosis at this time was that of scabies and balanitis, for which the case was treated.

In four days the scabies was cured, and all the abrasions excepting those at the coronal sulcus were healed. The patient, however, was kept under daily observation for a period of five weeks. During this time fifteen separate, typical hard chancres appeared. They made their appearance at different times, some during the third week and others as late as the sixth week after coitus. Eleven of them occurred at the seat of abrasions already mentioned. The lymphatics leading from the penis were hard and thickened, and the inguinal glands, particularly on the left side, on which most of the chancres were situated, were enlarged and presented a board-like hardness.

The interesting features presented by the case, according to Sack, are, first, the multiplicity of the initial lesions; second, the strong probability that several initial lesions may occur in syphilis from a simultaneous infection, and in addition a support to the view that an initial sore may give rise to others by autoinoculation, which is also supported by the observations of Köbner, Keyes, Pontoppidan, and others. Sack believes that the chancres developing in the sixth week after coitus probably developed from those of the third week by autoinoculation.

Lead-poisoning.—Pel (*Centralblatt für innere Medicin*, 1897, No. 23) reports three cases illustrating the difficulty of recognizing lead-poisoning when the

history is not clear. The first was a shoemaker, who acquired an intoxication from holding pewter-coated nails in his mouth. A cigarmaker, who rolled cigars on a pewter-covered board, and held the knife with which he cut them in his mouth between whiles, had typical plumbism. The third case was that of a diamond-worker, who, for fifteen years, was employed in fixing the small diamonds in a warm lead mass; the fingers were kept moist with saliva. This patient left the diamond factory, and five months later was attacked with acute lead-poisoning. The case is interesting on account of the latency of the poison. Pel points out the great variation in the susceptibility of different individuals to plumbism. The cases reported must have been poisoned with very small quantities.

The Florence Reaction.—Posner (*Berliner klinische Wochenschrift*, 1897, No. 28) describes the crystals obtained by the Florence test for semen. He adds an iodine-rich solution of iodine and potassium iodide to fresh semen or to a watery extract of the stains, and obtains numerous dark-brown crystals of various forms—rhombic tablets, fine needles. These crystals have a great value for forensic medicine. The reaction does not depend upon the presence of spermatozoa in the fluid. It may be obtained from the seminal fluid in cases of complete azoospermia as well as from the secretion of the prostate. The crystals must come from some chemical body, and the idea that they might come from spermin seems to be borne out by the fact that the addition of the reagent to a solution of spermin phosphate gives typical Florence crystals. Extracts from spermin-containing organs (ovary) gave also a positive result.

Richter has tested many of the other substances found in semen. One of the decomposition-products of lecithin (cholin) yielded typical crystals. The Florence reaction should be of aid in doubtful cases, but cannot be certainly relied upon, as it is given by other substances than semen.

The New Tuberculin.—Schultze (*Deutsche medicinische Wochenschrift*, 1897, No. 28) has tried to limit his cases, as recommended by Koch, to those whose temperature has never been over 38° C. He has subjected nine such patients to treatment for periods varying from one to two months. The treatment has not had the bad effects that sometimes come from the old tuberculin. During the treatment one case acquired a tuberculous ulcer of the larynx, one a severe diarrhœa, probably tuberculous. Four remained unchanged. In one a pleurisy was improved. The last two improved. It is too early to say how many of the changes in the condition of these patients was due to the tuberculin.

Bussinius reports from B. Fränkel's clinic the results of treating nineteen patients with the T. R. tuberculin. In fifteen of the cases the cure was complete—that is, they began with $\frac{1}{5000}$ mg. and increased to 20 mg. The author thinks the dose should be increased more gradually than by the method of doubling it each time. Eight of the patients gained in weight and five lost. There was quite a marked tendency to reaction after the injection, different samples of the tuberculin varying greatly in this respect. Neither blood nor albumin was ever observed in the urine. Locally, there were no abscesses, but several times painful infiltrations. The cough improved

twice, but no changes in dull areas could be made out. No marked changes were observed in the pharyngeal or laryngeal cases. There was a slight tendency to diminution of the swelling. Three cases of lupus seem to have been considerably improved.

SURGERY.

UNDER THE CHARGE OF

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Congenital Blood Cyst of the Neck and Axilla.—KCZANOWSKY (*Deut. Zeit. für Chir.*, Band xliv. Heft 3 u. 4) reports an interesting case of an apparently congenital cystic tumor, which occupied the left supraclavicular and infraclavicular areas in a four-months' old child. Puncture with a hypodermic needle produced a severe hemorrhage, which was difficult to control. The cyst was evidently in communication with the subclavicular vein. It was rapidly increasing, and there seemed to be great danger of its rupture and the death of the child. Operation, on the other hand, seemed too dangerous and wellnigh impossible from the amount of hemorrhage that must necessarily occur. The author consequently attempted to compress the tumor by the application of cotton and a compressing bandage. His efforts were successful; the tumor decreased one-half its size in six weeks, and in four months nothing remained. There has been no return and there is no trace of the growth at present. The child is now six years old.

Aneurisma Arterio-venosum Ossificans Traumaticum.—FICK (*Deut. Zeit. für Chir.*, 1896, Band xliv. Heft 3 u. 4) reports a case of arterio-venous aneurism of the femoral artery and vein, which occurred in the service of v. Manteuffel and which presented the peculiarity of ossification in the wall of the aneurismal sac.

The patient had a fall, with a severe bruise of the lower third of the thigh. Swelling and marked ecchymosis followed, with pain upon pressure. The swelling subsided, but a small tumor remained, which was painful on pressure and also on motion, interfering with the usefulness of the limb. The tumor lay on the inner aspect of the thigh, at the junction of the middle and lower thirds, adherent to the bone, with no discoloration or swelling of the soft tissues surrounding it at the time of entering the hospital.

The history and bony hardness of the tumor led to a diagnosis of osteo-

sarcoma. The operation was attended with much bleeding, and it finally became necessary to tie both the femoral artery and vein. During the operation the femoral artery was successfully sutured after a linear tear. The recovery after the operation was complete, with a restoration of the circulation, with only a slight temporary œdema. The tumor was found to be an arterio-venous aneurism, with bony deposits in its walls.

Incarcerated Retroperitoneal Hernia.—SCHULTZ (*Deut. Zeit. für Chir.*, Band xliv. Heft 3 u. 4) reports an interesting case of retroperitoneal hernia which simulated in a marked manner incarcerated inguinal hernia.

The patient, when first seen, had a marked swelling in the inguino-scrotal region and symptoms of intestinal occlusion. The swelling, however, disappeared to a great extent upon the application of cold. There persisted, however, a swelling in the inguinal lymphatic glands of the right side which were not present on the left. The persistence of the symptoms of obstruction with the presence of these glands, as formerly noted by Rose, led the author to a diagnosis of an internal incarcerated hernia on the right side. There was a marked induration at a point just above Poupart's ligament about its middle. This and the presence of vomiting, distention of the abdomen, and absence of stools led the author to operate. The operation disclosed a retroperitoneal pocket with a sharp upper edge, which was about the size of a walnut; it was filled by a knuckle of small intestine. The intestine was distended above and flattened below, while the strangulated portion was markedly discolored, but not sufficiently so to necessitate resection. The recovery was complete, though retarded by slight suppuration about the catgut sutures.

Suppuration from Sterile Catgut.—From experiments performed in 1895, ORLANDI (*Cent. für Chir.*, February 13, 1897) showed that there is produced by the introduction of sterile catgut into animal tissues (1) an acute reaction which is of little moment and is to be explained by the chemical reaction produced by the agents employed in sterilizing and preserving the catgut. 2. A reaction which has nothing to do with the preparation and sterilization of the catgut, but is produced by bacteria or the results of their action upon the tissues. These bacteria and their products are present in the catgut before its sterilization, and can give rise to so marked a chemotactic action that a true abscess-formation, with an outpouring of leucocytes, is produced, while the catgut is still sterile and benign.

The author publishes the results of a further series of experiments which he has undertaken with the purpose of determining if the reaction produced by the catgut present in a sterile field will influence the development and biological action of infecting bacteria which by any chance infect the previously sterile field.

The observations were confined to experiments with the bacillus coli and the staphylococcus pyogenes aureus, and led the author to the following conclusions:

1. The area in which the catgut is introduced forms easily abscesses, with a tendency to rapid necrosis.

2. The micro-organisms are somewhat altered in their development and virulence.

3. If the animals were inoculated with virulent cultures intravenously, instead of at the area where the catgut was introduced, there was produced an infective reaction at the point where the catgut was introduced.

This, however, did not take place if the inoculation was subcutaneous and in an area which was neither in the same circulatory area nor contiguous to the wound-area.

The Union of Reimplanted Bone Buttons after Trephining.—By a carefully conducted series of experiments DAVID (*Archiv für klin. Chir.*, 1896, Band liii. Heft 4) has proved that the buttons of bone which have been entirely removed from the skull unite when reimplanted under aseptic conditions in a manner analogous to the reparative action seen in other tissues, and that there is neither an entire new formation of bone nor any necrosis of the implanted fragment.

These results were obtained by operating upon a series of dogs which were killed at regular intervals of one week, from four days to fourteen weeks after the operations had been performed. He thus secured a series of histological specimens which clearly demonstrated the fact related and that the process of repair was a normal aseptic union between the fragment of bone and the remainder of the skull, and that there was no absorption or necrosis of the fragment, but that it remained intact and became united to the other bone.

Castration in Enlargement of the Prostate.—JONES (*Annals of Surgery*, March, 1897) communicates the results which he has obtained in four cases of enlarged prostate.

The first patient was sixty-seven years of age, and had suffered for years with urinary disorders which had obliged him to retire from business a year previous to operation. When first seen the bladder was found distended, reaching above the umbilicus. There was no history of overflow, but he passed two or three ounces of urine several times a day and almost half-hourly during the night. The urine was alkaline, putrid, and loaded with mucus and contained pus. The passage of the catheter was not attended with great difficulty, although clearly obstructed at the mouth of the bladder. His prostate was as large as a Newtown pippin, presenting a marked convex protrusion in the rectum, hard and unyielding, painful to touch. His scrotum was covered with herpes. The operation was delayed until the herpes was cured. There was nothing extraordinary in the operation; both testicles were removed. In a fortnight's time the prostate had sensibly diminished in hardness and he had less pain. His urine presented less fetor and purulent deposit. The residual urine diminished in six weeks to one-fourth its usual amount, and two months after operation he felt comfortable and able to dispense with the catheter. A later examination showed the prostate reduced one-half. There was barely any residual urine, and he could retain his urine for hours.

The second case was a patient, sixty-five years of age, who had led a catheter life for five years, and frequently suffered from retention and at times from decomposition of the urine. The case was complicated by double inguinal hernia. Double castration was performed; the prostate was the size of a hen's-egg before operation, and three months later was reduced to about

one-half its previous dimensions. In a fortnight the bladder commenced to act, and in six weeks no occasion for a catheter existed.

In a case fifty-six years of age, with a complication of stone in the bladder and prostate, he divided the vas. Although no marked decrease was noted in the prostate, there was an amelioration in symptoms, more especially in regard to the diminished residual pool. Later, by a suprapubic incision, a large phosphatic calculus was removed from the bladder and another smaller one from the prostate, with considerable benefit.

The fourth case, though recent at the time of writing, showed marked signs of improvement, and the author says that his experience in castration for enlarged prostate, judged in the light and promise of four cases, is distinctly a happy one, and should, he ventures to think, encourage a more frequent recourse to it.

Apophyseal Ligation.—CHIPAULT (*La Méd. mod.*, October, 1896) describes an operation for the treatment of different forms of spinal curvature, which he has found very successful.

The operation he describes as follows: A longitudinal incision is made along the line of the posterior spinous process, extending two or three vertebræ above and below the curvature. Without injuring the intraspinal ligaments the muscles are dissected away and held apart by strong curved retractors. The posterior face of the vertebræ is thus exposed. Extension and counter-extension are now made by two assistants, one grasping the patient in the axilla and the other by the lower extremities, with the same care as would be exercised in placing in position a plaster-of-Paris jacket, until the curvature is obliterated.

When this reduction has been accomplished a silver-wire suture, of a size suitable to the individual case, is passed beneath the intraspinous ligament, above the first vertebra which it is desired to fix, and as near to the base of the spinous process as it is possible to come. The wire should be more than twice the length of the wound. Each half should now be made to cross the other beneath the intraspinous ligament in the next space, and this continued, the wires crossing in each intraspinous space, until the last vertebra is reached which it is desired to fix, when the wires are fastened by tightening them and securely twisting them together. It is essential to pass the wires in each case as close to the base of the apophysis as is possible, and to exert sufficient tension at each step to maintain the spines already ligated in a fixed position.

In dealing with a cyphoscoliosis the method is modified simply by reducing the scoliosis, and after placing the above ligature, returning with one end, which has purposely been left long enough, along the lateral spines of the vertebræ on the side of the former convexity, and maintaining them in such a manner as to prevent the return of the scoliosis.

The author has performed nine of these operations for the following conditions: six ligations for Pott's disease; one ligation for rheumatic arthritis of the middle cervical vertebræ accompanied by torticollis; one for a rhachitic lumbar cyphosis; one for a severe form of infantile rhachitic scoliosis.

The author does not intend to say that this should be the treatment for all

cases of spinal curvature. These ligatures are not applicable to all forms or cases of Pott's disease, of cyphosis, or of scoliosis; numbers of cases are cured by other more simple means, as by means of gymnastic exercises and other usual forms of treatment. This method is not sufficient of itself, but requires the use of well-applied splints and jackets, in accordance with the severity of the case.

Two Cases of Nephrotomy for Anuria.—CHEVALLIER (*La Méd. mod.*, October 28, 1896) reports two cases of nephrotomy for anuria. In the first case the patient was a man of tuberculous diathesis, whose urine decreased from three ounces to one and one-half ounces in spite of injections of serum and caffeine. Both kidneys were diseased, especially the left, and it was this one which he incised.

He did a nephrotomy, as it was impossible to make out the form of the kidney and reach the pelvis in that manner. He closed the wound after having introduced a drain. The patient died fifteen days after the operation, of pulmonary disease, caused by taking cold. The autopsy showed that of the two kidneys the only one whose ureter was patulous was the one upon which he had operated, and that only after the operation.

In the second case the patient was a female, sixty-three years of age, the subject of lithiasis and of a lithæmic family. She came into the hospital in a state of coma, with myosis and an enormously distended kidney. He performed a nephrotomy similar to the one described above; his finger entered directly into the pelvis of the kidney. The pelvis was washed out and drained, and the patient made a good recovery.

The author concludes that nephrotomy is the operation of choice in cases of anuria which threaten life. They have the value of an *anus contra nature* in the case of gangrene of the intestine. They save the situation as Pousson has shown. The fistula is closed by a secondary operation.

Comparative Value of Suprapubic Puncture and Cystotomy in Acute Retention of Urine.—LEGUEN (*La Méd. mod.*, October 28, 1896) divides these cases according to the obstruction, as follows:

1. Acute retention due to prostatic lesions.

(*a*) In cases in which the bladder is distended and the urine stagnated, and attempts with different forms of sounds and with Gely's apparatus have been unsuccessful, and something must be done to relieve the pain, puncture should be resorted to. The puncture may be repeated two or three times a day for four or five days, if necessary. Frequently such treatment will make it possible to pass a sound later.

(*b*) In other cases catheterism is impossible. There are false passages and the prostate occludes the urethra; the patient should not be allowed to remain at the mercy of punctures; suprapubic cystotomy should be immediately performed, though in some cases it may be used only secondarily. This should be done even in cases of clear urine after puncture has been tried for four or five days without catheterism being made possible. It should also be done when catheterism is not well supported.

2. In lesions of the anterior urethra the course to pursue is to attack the obstacle by an external urethrotomy without a sound, if necessary, and the

posterior part of the urethra should be found. If the posterior end is not readily found, a suprapubic cystotomy should be performed and then by a retrograde catheterism the end found and the urethrotomy completed.

3. In case of a lesion of the posterior urethra he performs an external perineal urethrotomy with the aid of a staff. Cystotomy and retrograde catheterism are indicated in certain cases, as of traumatic origin, as in fracture of the pelvis.

In *résumé*, he says: 1. Hypogastric puncture is an excellent device; but it is expectant treatment to be used in emergency. It is without effect upon the lesion which is responsible for the retention.

2. Suprapubic cystotomy is a palliative and, at the same time, a curative measure. It is indicated in cases of infected prostatitis where there are false passages, and in cases where repeated catheterism has not re-established the urethra. It is the first step in many operations upon the posterior urethra. It is the second step in certain operations on the anterior urethra.

Iodides in the Thyroid Gland.—Weiss (*Münch. med. Woch.*, January 5, 1897) comments upon the richness in iodides of the glands of the inhabitants of Breslau, as shown by the researches conducted in the clinic of Prof. Ponfick. The amount of iodide was determined in the thyroid glands of adults who died from various causes, in persons suffering from goitre who died from an intercurrent disease, and in infants.

In fifty adults who died from sixty to seventy-seven years of age the desiccated thyroid weighed, on the average, 7 gr. 2, and contained 4 mgr. 0.04 of iodide. The average weight of the thyroid gland of the inhabitants of Silesia is, therefore, less than that of the inhabitants of Berlin (7 gr. 4), and of Freiburg (8 gr. 2), and greater than that of the inhabitants of Hamburg (4 gr. 6.) On the contrary, the average amount of iodide contained in the thyroid glands of the inhabitants of Breslau is greater than that of the inhabitants of Hamburg (3 mgr. 83) and of Freiburg (2 mgr. 5) and less than that of the inhabitants of Berlin (6 mgr. 6).

In the case of patients suffering from goitre the amount varied according to whether the patient had or had not been treated previously with the iodides. In those, to the number of nine, who had not been treated by the iodides, there were found traces, in two cases, and quantities varying from 6 to 11 mgr. In eleven cases treated by the iodides the amount found was from 12 to 18 mgr. In children under seven years the amount varied from traces to 0 mgr. 0.07 to 0 mgr. 0.78.

Congenital Fibro-papilloma of the Sole of the Foot.—Duiet (*La Méd. mod.*, November 4, 1896) reported the following interesting and rare case to the French Surgical Society: the patient, a boy, fifteen years of age, had a congenital tumor on the sole of his foot, which was painless, and of the thickness of four or five fingers; it occupied the entire sole of the foot and extended up on the sides and toes. It was traversed by deep furrows. The veins of the leg and thigh were exceedingly varicose, and were as large as one's thumb, and had the appearance of a cirsoid aneurism. The neoplasm made its appearance in the patient's third year, as small white elevations, hard, and the size of a pin's head in the centre of the foot.

Extirpation seemed impossible on account of the tenderness of the scar and the attending contractions. The author decided to remove it by abrasion. He employed a histological section-knife, after having removed the greater part of the tumor in small pieces with strong scissors. At the end of a few weeks fresh healthy granulations sprung up, and he succeeded in covering them by Thiersch's method of skin-grafting, and the patient is now able to walk, two years since the operation, without any pain or injury to the surface, and without recurrrence.

The Causation of Chloroform Syncope.—After a careful and comprehensive study, HILL (*British Medical Journal*, April 17, 1897) comes to the following conclusions:

1. Chloroform produces a primary failure of the circulating mechanism and a secondary failure of the respiratory centre. The respiratory centre fails to act not only because it is damaged by the drug, but because of the anæmia of the spinal bulb produced by the fall of arterial tension. This is proved by the fact that the action of the respiratory centre can be renewed by raising the arterial tension. The depth of anæsthesia depends, as does the paralysis of the respiratory centre, on the primary fall of the arterial tension.

2. Chloroform, more than any other known agent, rapidly abolishes the vascular mechanisms which compensate for the hydrostatic effect of gravity.

3. Chloroform abolishes these mechanisms by paralyzing the splanchnic vasomotor tone and by weakening the action of the respiratory pump. When these mechanisms are totally abolished the circulation is impossible if the subject be in the feet-down position.

4. Chloroform also produces paralytic dilatation of the heart. It acts directly like amyl nitrite on the musculature of the whole vascular system.

5. There are two forms of chloroform syncope: (*a*) during primary anæsthetization. The patient struggles, holds his breath, raises the intrathoracic pressure, congests his venous system, lowers his arterial tension, and finally takes deep inspirations and surcharges his lungs with chloroform. In the first stage the left heart becomes impoverished; in the second stage it is suddenly filled with blood. This is drawn from the lungs, and is full of chloroform. The chloroform passes into the coronary arteries, and the heart is thrown into paralytic dilatation. Respiration and the pulse either cease simultaneously or the pulse before respiration. (*b*) During prolonged anæsthetization this arises from gradually giving chloroform to too great an extent. The arterial pressure falls lower and lower, and, secondarily, the respiration ceases because of the anæmia of the spinal bulb. The heart is not in this case paralyzed by chloroform, because the drug is taken in gradually by the shallow respirations and distributed slowly by the feeble circulation.

6. Artificial respiration and the assumption of the horizontal position, if applied in time, will always resuscitate a patient from the second form of syncope.

7. Artificial respiration, established with the patient in the horizontal position, is also the treatment indicated in the first form of syncope; the heart should be rhythmically compressed by squeezing the thorax. If this does

not quickly lower the pulse, the patient should be put into the vertical, feet-down posture. The dilated right heart is thereby completely and easily emptied of blood. Artificial respiration is maintained during this manœuvre, and the patient is brought once more into the horizontal posture. By rhythmic compression of the chest an efficient circulation is maintained through the coronary arteries; by first emptying and then filling the heart a fresh supply of blood is brought into that organ. If this does not prove successful on the first trial, it can be repeated.

8. Inversion—that is, placing the subject in the feet-up position or compression of the abdomen—will increase the paralytic dilatation of the heart. In this kind of syncope both these forms of treatment are worse than useless.

9. In the condition of shock or emotional fear the compensatory mechanism for the effect of gravity is almost abolished, and chloroform may easily be the last straw to completely paralyze the circulation.

10. Vagus inhibition of the heart is of no importance as an agent in the production of chloroform syncope.

11. Ether is in every respect a far safer anæsthetic than chloroform. According to Binger's experiments on the heart, ether is fifty times less dangerous than chloroform.

12. With the practical conclusion of the Hyderabad Commission, that the chloroform inhaler should be removed during the struggling of the patient or when the respiration is of irregular depth, I am in absolute agreement; but I consider their interpretation of their own experiments and tracings concerning the origin of chloroform syncope to be mistaken.

Not only the work of all physiologists, but also the tracings of the commission, when rightly interpreted, prove that paralysis of the circulatory mechanisms, and not of the respiratory centre, is to be dreaded by the anæsthetist.

Uretero-pyelo-neostomy.—Among the tendencies of modern surgery the true conservatism of the aseptic and antiseptic era is the most marked of all advances.

Bazy (*Revue de Chirurgie*, May 10, 1897) draws particular attention to this fact in connection with operations on the kidney, in which, instead of performing nephrectomy, the attempt should be made in many cases to preserve the kidney in all its functional activity, illustrating the fact that if it is a great surgical feat to remove a viscus or a portion of the viscera it is a greater scientific achievement to preserve it and restore its function.

He reports two cases in which there was a large hydronephrosis. In the first he was enabled to re-establish a communication between the pelvis of the kidney and the bladder by resecting the ureter and implanting the distal portion into the most dependent portion of the dilated pelvis. This was accomplished in the following manner: Through a median laparotomy the tumor was reached, the fluid withdrawn by an aspirator, and the pelvis of the kidney incised. The orifice of the ureter was found far up on one side. It had been flattened out by the pressure of the pelvis and occluded in this manner. A fine catheter was passed through it nearly or into the bladder. The ureter was then resected. One side was cut open for a little way to enlarge the entrance and procure a larger surface to implant into the pelvis. An opening was made in the most dependent portion of the pelvis. A soft

catheter, from which the tip had been removed, was passed a short distance into the ureter, while the other end passed out of the abdominal wound and gave, through an opening situated in the catheter within the pelvis of the kidney, exit to the urine in both directions. Drainage being provided in this manner, the ureter was stitched to the pelvic wall by interrupted catgut sutures, while a Lembert suture of silk was placed externally, care being taken not to penetrate the mucous surface so that the silk would come in contact with the urine. The wound in the pelvis of the kidney was stitched to the abdominal parietes, which were then closed by the ordinary layers of interrupted catgut and silkworm-gut sutures. The patient made a slow but complete recovery, the urinary fistula closed, and the complete function of the ureter was restored.

The second case was one of single kidney of the bi-lobar form. Nephrectomy was impossible, and, although the patient's condition was very poor, the attempt was made to restore the ureter. The kidney was, however, the seat of an infection, and the patient succumbed to a general infection, although the ureter was readily found, the operation performed, and the flow of urine re-established into the bladder.

Wire Hooks for Holding Open the Edges of Abscesses.—As a substitute for gauze tampons or drainage-tubes, BRAATZ (*Centralblatt für Chirurgie*, 1897, No. 16) recommends the employment of retractors formed of wire, which he finds hold the lips of the wound open more certainly and give better drainage than either gauze or rubber tubes, both of which are compressed by the edges of the wound, so that they do not fulfil the purpose for which they were employed.

These retractors are made of different sizes, and are held apart by a band of wire which passes from one to the other. They may also be made in spiral form for deep drainage, or gauze and rubber drainage-tubes may be employed at the same time, being inserted between the retractors. The author has employed them in numerous cases with gratifying results.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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OF PHILADELPHIA.

The Progress of Laryngology and Rhinology.—DR. ST. CLAIR THOMSON, of London (from the Diamond Jubilee Commemoration number of the *British Medical Journal*, June 19, 1897), presents a succinct summary of the progress of laryngology and rhinology in the sixty years of the Victorian age, which is adorned with the reproduction of a signed photograph of

Manuel Garcia, the still living distinguished nonagenarian singing master of London, whose use of the dental mirror, for the purpose of studying the mechanism of voice, gave, in 1854, the initial impulse to laryngology of the present day.

Hard Fibroma of the Maxillary Sinus, with Pyæmia of the Frontal Sinus.—Dr. L. J. Hammond reports (*Phila. Polyclinic*, August 7, 1897) this interesting case, which is illustrated with instructive wood-cuts. An Irishman, aged thirty-eight years, laborer in a chemical works, suffered violent pain in the left side of his face and forehead, which had resisted all manner of treatment—even the removal of his teeth on the left side of the upper jaw. There was a suppurative discharge from the left nostril and from the site of the second bicuspid tooth. The cartilaginous septum was gone, the loss attributed to the handling of vitriols. The pain was found to be largely due to pressure upon the dental and infra-orbital nerves by a growth in the maxillary sinus. This was removed after access to the parts from the exterior. An additional operation was necessary to trephine and drain the frontal sinus, and an incision was selected over the promontory roof of the nose and continued far enough to allow the flap to expose the inner edge of the superciliary ridge, at which point the sinus was trephined. The treatment gave complete relief, which had been permanent up to the date of the report. The record of this case is exceedingly instructive in its details.

Paralysis of the Larynx in Typhoid Fever.—M. Benoud (*Lyon Médical*, March 28, 1897; *Boston Medical and Surgical Journal*, April 29, 1897) recently reported to the Lyon Society of Medical Sciences a case of paralysis of the posterior crico-arytenoid muscles occurring in the course of typhoid fever, which came on during the third week of the disease and was followed subsequently by paralysis of the soft palate. It is stated that in a recent monograph by Bouley and Mendel seventeen cases of paralysis in typhoid fever are reported, in six of which the posterior crico-arytenoid muscles were involved.

The Causes of Paralysis of the Recurrents.—M. Lermoyez (*Revue Internationale de Rhinologie, Otologie, et Laryngologie*, August, 1897) recently read an admirable and elaborate paper upon this subject before the French Society of Otology, Rhinology, and Laryngology, which we would commend to the careful study of those who have access to the original article, but which is too extensive even for an abstract in these columns.

In concluding his report three principal types of paralysis of the recurrents were presented for discussion:

First, incurable grave paralysis leading to death in consequence of the lesions which have produced it.

Second, incurable benignant paralysis, the cause of which often escapes us, but which is ordinarily simply an infirmity compatible with a prolonged life.

Third, curable and benignant paralysis, in which recovery takes place without any trace of its existence, and which seems to be but the result of a primitive neuritis, of which catching cold is one of the factors.

Laryngectomy.—M. DEPAGE reports (*Revue Internationale de Rhinologie, Otologie, et Laryngologie*, August, 1897) one case of total laryngectomy and one of partial laryngectomy—both successful. In the former the mouth was entirely shut off from the air-passages, and the patient for a while showed great distress for the want of a voice, and insisted upon having the communication between the mouth and the windpipe restored; but little by little he learned to articulate sounds sufficiently satisfactory to make himself understood, and since then has become satisfied with his condition.

Tracheotomy in Emergencies.—In an article on "Ideal Anæsthesia" (*Medical Record*, September 25, 1897), by DR. RAWLINGS NICHOL, of New York, he commends the method proposed by Dr. von Donhoff for performing tracheotomy in an emergency. "A curved needle, threaded, is passed through the trachea; then the tracheal rings are cut, and the thread is caught by a blunt hook; this thread is divided in the middle and the two strings it forms are loosely tied at the back of the neck."

Œsophagotomy and Removal of Dental Plate with Upper Central Incisor Tooth.—This case was reported (*N. Y. Medical Journal*, 1897, No. 981) by DR. A. A. SNYDER, of Washington. The operation was performed under chloroform narcosis with the loss of less than a drachm of blood, and the patient made a good recovery.

Sloughing of the Mucous Membrane of the Œsophagus.—DR. J. C. BROWN, of Smithport (*N. Y. Medical Journal*, 1897, No. 981; *Buffalo Medical Journal*, September), reports a case of corrosive poisoning in a robust man, thirty-two years of age, in which the mucous membrane of the œsophagus and of a part of the stomach was vomited as a complete cast. The œsophageal portion was in perfect shape, with the exception of a few small holes which might have been made in the effort to expel it. The stomach portion was somewhat torn in strips, due perhaps to a more pronounced effect of the corrosive agent. The whole was about sixteen inches in length. The case terminated fatally.

Incomplete Fracture of the Left Cornu of the Thyroid Cartilage, Resulting from Self-Inflicted Violence.—DR. A. DE ROALDES reports (*N. Y. Medical Journal*, 1897, No. 949) a case in which violent manipulation of the larynx in an endeavor to get rid of an olive-seed which had been inspirated, resulted in an incomplete fracture of the left cornu of the thyroid cartilage.

(The laryngoscopic picture looks as though it might be a duplicate of a picture made some years ago for one of the compiler's cases in which the projection was attributed to a similar lesion.)

Pharyngeal Teratoma.—DR. A. DE ROALDES reports (*N. Y. Medical Journal*, 1897, No. 949) a remarkable case of fibro-chondroma of branchial origin removed from the throat of an infant six weeks old. It is accompanied by illustrations of the microscopic and macrocospic appearances. The growth was extirpated with a wire snare and forceps, and the child made a satisfactory recovery.

OBSTETRICS.

UNDER THE CHARGE OF

EDWARD P. DAVIS, A.M., M.D.,

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Cæsarean Section for Contracted Pelves.—OLSHAUSEN contributed a paper upon this subject to the Moscow Congress (*Centralblatt für Gynäkologie*, 1897, No. 38), in which he reported twenty-nine Cæsarean sections performed upon twenty-four mothers for contracted pelves. The greater portion of these were for rhachitis. Twenty-nine children were born living and twenty-six left the hospital living. The children were all much above the average size. Two mothers died, one of sepsis, the other from a towel left in the abdomen by an assistant. Most of these patients had a pulse above 120 for some days, while the temperature ranged from normal to 102°.

His method of performing the operation is as follows: The uterus is turned out of the abdomen and the abdominal wall temporarily closed behind it. The operator palpates the uterus to ascertain the site of the placenta. If he cannot do this he makes an incision at the fundus to avoid the placenta. After extracting the child the placenta is loosened and removed. The inner lining of the uterus is disturbed as little as possible. No elastic tube is placed about the cervix, as Olshausen thinks it exposes the child to danger of asphyxiation. After the uterus is emptied the cervix is compressed by an assistant. To guard against bleeding the patient is given ergotine before the operation. Catgut is the suture material employed.

In view of the success of the modern operation Olshausen thinks it absolutely indicated in many cases, and that its relative indication has a much wider scope. It remains the best method for speedy delivery, as in eclampsia. It is simpler than symphysiotomy and its results are more assured.

In discussion, LEOPOLD had to deal in Saxony with many contracted pelves, and in the last fourteen years had done ninety-three Cæsarean operations, in sixty-seven of which the uterus was retained, while in twenty-six hysterectomy was done. He uses the elastic ligature about the cervix for a few moments only. Ten of his patients had the operation more than once. He diagnosticates the position of the placenta by the distance between the round ligaments. To save the child's life he has operated successfully upon a woman who had a violent gonorrhœa. Although the operation is so successful, the induction of labor is most available for the average practitioner. His mortality rate in ninety-three operations was 8, or $8\frac{9}{10}$ per cent.

Symphysiotomy.—In the *Monatsschrift für Geburtshülfe und Gynäkologie*, 1897, Band 6, Heft 3, ZWEIFEL contributes a paper written for the recent International Congress at Moscow. He finds sufficient reason for this paper in the criticisms which have been made upon the operation and in his own success in its employment.

He has had at the clinic at Leipzig thirty-one symphysiotomies; all of the mothers recovered without inconvenience or injury; twenty-seven of the children survived and left the hospital in good condition. Referring to cases reported in which patients could not walk without difficulty, he considers this to be due to excessive stretching of the pelvis and specially to injury of the sacro-iliac joint. He would limit the operation to cases in which the conjugata vera is not less than $6\frac{75}{100}$ cms., and he believes that the best results are obtained when the limit is placed as high as 8 or $8\frac{1}{2}$ cms. He believes that no more danger of hemorrhage exists with symphysiotomy than with Cæsarean section, and he has found it quite sufficient to bring the hips of the patient strongly together, to use a tampon of iodoform or sterile gauze in front and behind the symphysis, and to make counter-pressure by tamponing the vagina. To avoid a laceration, he allows the child, whenever possible, to be expelled by the mother's efforts.

He believes that bad results following this operation are caused chiefly by septic infection, and that such occur because the symphysiotomy wound is improperly handled. He insists upon draining this wound and making pressure upon the tissues about the symphysis with gauze and an abdominal bandage. He prefers the open treatment of the symphysiotomy wound, draining it with gauze for eight or ten days until it is filled with granulations. He sews together the symphysis, using two or three sutures which can be absorbed, and usually adding two sutures which are to remain. His exact method of operating consists first in limiting the operation to those cases in which the fœtus is not only living, but, by reason of its uninjured condition, is likely to survive. The patient's thighs are allowed to hang down, and a transverse incision is made through the skin about a finger's breadth above the symphysis. Superficial vessels are tied. The fasciæ over the symphysis and linea alba are separated from their attachments to the bone, and the tissues are loosened from the lower edge of the subpubic ligament. A silver catheter is then placed in the urethra, the finger of the left hand passed behind the symphysis, pushing aside the bladder, and the joint is opened with a probe-pointed knife from above and forward until all fascia and ligaments are separated. He uses a strong knife whose back is not too thick to go readily between the bones. The hanging posture of the legs helps to draw asunder the bones when the cut is made. The symphysiotomy wound is packed with sterile gauze, moderate pressure is made upon the iliac bones, and the patient is delivered, if possible, spontaneously. If slight delay occurs, a broad band of flannel or rubber is placed across the pelvis, and the head made to descend by pressure. He finds oftentimes that bleeding occurs when the head emerges, while not infrequently the head lodges obliquely upon the pelvic floor and must be delivered by forceps. The pubic bones are then brought together by two stitches of catgut and two of non-absorbable material, a catheter is placed in the bladder, and the symphysiotomy wound packed with gauze. The stitches are brought together through the greater part of its extent. The gauze remains eight or ten days, is gradually shortened, and, if silver sutures have been used, they are removed when the granulations approach the surface. An ample antiseptic dressing and occlusion-bandage are kept over the wound.

In three of his cases injury occurred to the urethra or bladder; once by a

catheter, once when the urethra was caught between the pubic bones by the removal of the gauze, and once when a pair of tenaculum forceps injured the urethra. In none of these cases was the complication a serious one. Zweifel has found the pelvis appreciably enlarged after symphysiotomy. He believes that such a pelvis will permit spontaneous birth more readily than before symphysiotomy.

In the *Centralblatt für Gynäkologie*, No. 38, 1897, VARNIER also contributed a paper upon this subject, in which he arrived at the following conclusions: An enlargement in the pelvic diameters gained by symphysiotomy reduces infant mortality so greatly that the death-rate of children born after symphysiotomy in contracted pelves is the same as the death-rate of children born by instrumental labor of mothers who have normal pelves. Hemorrhage and injury play a very unimportant part. If infection does not occur symphysiotomy is no more dangerous from these causes than is any other instrumental delivery. Wounds to the bladder and urethra after symphysiotomy are generally caused by the use of forceps, and fatal cases result from septic infection which has its origin from the uterus or bladder or urethra. Complete recovery follows symphysiotomy. The operation may be repeated without injury to the patient. It does not, however, permanently enlarge the pelvis, as some assert. The operation should be made only in those cases in which the child is vigorous, the os and cervix completely open, and the membranes ruptured. It should never be made in a pelvis whose true conjugate is less than 7 cms. It is also indicated where the child is abnormally large and the pelvis normal. It should take the place of induced labor, violent efforts with forceps, and version and embryotomy on the living child. Varnier denies the value of Walcher's position in enlarging the pelvis. Symphysiotomy is indicated in symmetrical pelves where pelvic tumors are not present. It is not indicated in cases where the child is dying from neglect or pressure. In cases already infected, symphysiotomy need not be declined if care is taken that the symphysiotomy wound in no way connects with the infected genital canal.

The Injuries of Parturition, the Old and the New.—At the recent meeting of the British Medical Association at Montreal, the President's Address to the Section on Obstetrics and Gynecology was given by SINCLAIR, of Manchester (*British Medical Journal*, 1897, No. 1914). The text of his paper was the case of a young primipara, whom he saw in consultation, suffering from septic infection, with lacerations of the vagina caused by the use of forceps. The trend of his paper is to show that the use of antiseptics and anæsthetics has made physicians careless, leading them to resort to the use of forceps hastily and in cases which would terminate naturally if left alone.

He supports this statement by statistics from English physicians, which virtually amount to a statement that nearly 75 per cent. of the labor cases in manufacturing towns are terminated by forceps. He also alludes to the remarkable statement from the Rotunda Hospital that after forceps application women die from fretting. Sinclair then proceeds to show that at the Manchester Maternity about 9 per cent. of cases in the house are terminated by forceps without maternal mortality. In out-patient practice in the same clinic the forceps was applied in 1.4 per cent. He adds a list of statistics

from the maternities of the Continent, showing that the use of forceps varies from 1.4 to 22.6 per cent. of cases, the highest average being found at Munich in Winckel's clinic. He urges very strongly a strict limitation in the use of forceps. He thinks it improper to trust simply to mercurial solutions to secure antisepsis. He recognizes the value of closing lacerations, but in his observations such closure has not been very successful.

[We are not deeply impressed with the excellence of obstetric practice in the hands of the average English physician, if these statements are correct. It is unfortunately true, as experience has shown in the case of some, that a large obstetric practice can be built up by giving anodynes freely until the os is nearly dilated, and then by delivering the patient with forceps. Ensuing lacerations were closed when severe, and otherwise were left to heal by granulation. Such practice, however, is not that of the best obstetricians at the present day. Among neurotic and ill-developed women, whether those enfeebled by luxury or by hard work and little food, the forceps must often be used. Many of these cases are delivered by the use of Barnes's elastic dilators, assisting uterine contractions by stimulants and by manipulating the uterus without the use of instruments. In others, the timely use of forceps prevents uterine relaxation and hemorrhage, prevents exhaustion, and brings much speedier convalescence than delay in labor. It is, however, the practice of the best obstetricians in the United States to immediately close serious tears of the cervix, pelvic floor, and perineum, and under antiseptic precautions satisfactory union occurs in a great majority of cases. Septic infection is rare among patients in our best hospitals and equally rare in the practice of our best men in private houses. Dr. Sinclair's comments upon the use of forceps remind us that, if we mistake not, a member of the royal family of England was once allowed to die in childbirth because of an inexplicable reluctance to apply forceps.

Dr. Sinclair urges, however, an improvement in obstetric instruction so that the student shall receive the same teaching that is now given in surgery and medicine. The need of improvement in this direction in America is quite as great as in England.]

GYNECOLOGY.

UNDER THE CHARGE OF

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OF NEW YORK.

Intermittent Cysts of the Ovary and Kidney.—WILSON (*Birmingham Medical Review*, August, 1897) points out the fact that the disappearance of an abdominal cyst following the passage of large quantities of urine, usually regarded as pathognomonic of intermittent hydronephrosis, may also occur in connection with ovarian cysts. The following interesting case is cited: A multipara entered the hospital with a tumor of six years' standing, diagnos-

ticated as a monolocular ovarian cyst. She stated that on several occasions the tumor had completely disappeared, while at the same time she had marked polyuria. On opening the abdomen a thin-walled cyst was found, containing colorless fluid and universally adherent to the abdominal parietes. In three places in the cyst-wall were cicatrices marking the sites of probable ruptures. The difficulty of distinguishing between such cysts and hydronephrosis is greatest when the tumor fills the abdominal cavity. The relation of the large intestine to the cyst is most important, since it is only exceptionally that it lies in front of one of ovarian origin. If the gut is collapsed it may be distended by injections of effervescing salts. Vaginal examination will often throw light on the diagnosis; also catheterization of the ureter.

The writer advises closure of the abdominal incision and drainage through a lumbar opening when an obscure cyst is found to be renal.

Action of the Bacterium Coli Commune on the Endometrium.—MORISANI (*Archiv. di Ostetricia*, March, 1897) injected cultures of this bacterium into the normal uterine cavity with negative results. He then irritated the endometrium by different agents (probes, hot water, nitrate of silver, etc.) and repeated the injections. Death followed from septic endometritis and peritonitis in periods varying from fourteen to seventy-two hours. It is not clear what protects the healthy mucosa against the action of the microorganisms, but it may be inferred that either the normal secretion inhibits them, or that there may be some phagocytic action. When the mucosa was irritated both a local and a general infection speedily followed.

Cultures were injected into the rectum with a fatal result in all cases. In animals with a healthy endometrium the latter showed no evidences of inflammation, but when the mucosa had been previously irritated, septic endometritis developed as before.

Appendicitis in the Female.—RICHELOT (*La Gynécologie*, June, 1897) emphasizes the difficulty of diagnosing appendicitis in the female. He reports six cases in which it was impossible to decide positively before opening the abdomen. In the absence of a clear history and early observation of the case it is still more difficult to make an exact diagnosis. The presence of pain and a tumor in the region of the right tube and ovary, situated high up (the left being normal), should always awaken the suspicion of possible appendical trouble. On the other hand, an inflamed appendix may be adherent in the cul-de-sac. In the absence of any swelling, the pains complained of by certain neurotic females may simulate those of appendical origin. If the hymen be intact it is fair to infer that an inflammatory enlargement on the right side is due to appendicitis rather than to disease of the adnexa.

Appendicitis and Parametritis.—TREUBE (*Revue Gynécologie et de Chir. Abdom.*, No. 2, 1897) reports cases in which he operated for appendicitis and found that the true condition was disease of the adnexa, and *vice versa*. The relation of appendicitis to parametritits is of considerable interest. The writer believes that the relatively greater immunity of the female from appendicular inflammation is due to the close anatomical relation of the

meso-appendix to the right broad ligament. In the milder grades of post-puerperal infection, which do not reach the suppurative stage, the process is frequently ushered in with pains in the ileo-cæcal region, attended with vomiting and rise of temperature. A swelling may develop and rapidly disappear without further disturbance.

Experimental Appendicitis.—BEAUSSENAT (*Revue de Gynécol. et de Chir. Abdom.*, No. 2, 1897) presents the results of his experiments upon rabbits, which are as follows: 1. Appendicitis is always the result of infection; 2. This infection may be transmitted through the blood- or lymph-vessels; 3. There are no pathogenic organisms, though the most common etiological factor is the bacterium coli; 4. In order that these bacteria may become active it is necessary either that the vitality of the normal mucosa should be impaired or that phagocytic action should be diminished; 5. In every case of experimental appendicitis the accompanying infectious folliculitis spreads to the surrounding lymph-channels, and adenitis is the constant rule; 6. The predisposing factors cause the initial lesion, or favor the infection, by diminishing the power of resistance; 7. Entero-colitis is the chief predisposing cause, as proved by experiment, as well as by clinical observations; 8. Concretions in the appendix are the effect of the appendicitis, *not* the cause; 9. A foreign body may act as a predisposing cause, through the resulting traumatism.

Hæmatoma of the Vulva.—BINDER (*Centralblatt für Gynäkologie*, No. 34, 1897) reports the following interesting case of hæmatoma in a non-pregnant woman, not due to traumatism: An alcoholic subject, aged thirty-nine years, on lifting a tub of water from a chair to the floor, was suddenly seized with a sharp pain in the perineum, accompanied by a desire to have a movement of the bowels. In spite of violent straining she could pass nothing, and only increased the pain. On examination the right labium was found to be enlarged and tender to the touch. Between the anus and right tuber ischii was a tense tumor the size of an egg, quite sensitive. An ice-bag was applied to the external genitals. Three hours later the right labium had swollen to the size of the fist, and the vagina was almost filled by a bluish-red tumor springing from the right side, while the enlargement in the anal region had assumed a quadrilateral shape and was connected with the labial swelling. The symptoms were less severe than at first. The blood-effusion was entirely absorbed in the course of two weeks.

The writer attributes the accident to the effect of a sudden muscular effort upon vessel-walls weakened by excessive indulgence in alcohol.

Absorptive Power of the Vaginal Mucous Membrane.—LEUBUSCHER and MEUSER (*Zeitschrift für Praktische Aerzte*, 1897, Heft 2), as the result of a series of experiments with solutions of iodide of potassium introduced into the healthy vagina, found that when used in suppositories the urine showed the characteristic reaction within from two to three hours, though faintly. In an aqueous or glycerin solution the drug was absorbed more quickly and a larger amount was excreted. As compared with that of the

rectal the observers found that the absorptive power of the vaginal mucosa was quite feeble.

A caution is added against the indiscriminate use of large doses of the more powerful drugs per vaginam, especially in glycerin solutions, since the latter fluid may cause such a change in the surface epithelium that the absorptive power of the mucous membrane is greatly increased.

Intestinal Paralysis after Abdominal Operations.—ENGSTRÖM (*Zeitschrift für Geb. und Gynäkologie*, Band xxxvi. Heft 3) believes that while sepsis is the principal cause of post-operative intestinal paralysis, it may be due to other factors, such as mechanical or chemical irritation. The excessive use of saline purgatives previous to operation is to be mentioned as a possible cause. Psychical causes, especially excessive nervousness, are to be borne in mind.

Diphtheritic Venereal Ulcer of the Cervix Uteri.—RASCH (*Archiv für Dermatologie*, Band xxxix. Heft 1) calls attention to a specific lesion of the cervix described by Bernutz as "diphtheritic chancre," but subsequently unrecognized by most gynecologists. He describes three cases in which such ulcers were observed at the edge of the os externum. The multiple papules were slightly raised, with a grayish-yellow, finely granular surface, and bled easily. Inoculations on the thighs gave typical chancroids. They healed quickly under iodoform. The diagnosis was aided by the presence of chancroids on the external genitals.

The writer believes that these cervical ulcers developed on existing erosion of the os externum. Their yellow color distinguishes them from the grayish bases of true chancres.

Fetid Endometritis in Elderly Women.—MANSANGE (*Arch. de Tocol. et d'Obstet.; Centralblatt für Gynäkologie*, No. 21, 1897) called attention to the importance of making a correct differential diagnosis in these cases. This form of endometritis is accompanied by a purulent, rarely bloody, discharge from the uterus, which always has an extremely offensive odor. The patient complains of anorexia, vomiting, and pain in the stomach, and becomes rapidly emaciated until her condition is similar to that of a victim of carcinoma. On examination the vaginal mucosa is seen to be intensely congested in consequence of contact with the irritating secretion. The cervix uteri presents a normal appearance, the corpus being somewhat enlarged. Pain is experienced on passing the sound, and an escape of pus with offensive odor is noted on withdrawing the instrument.

It is impossible to distinguish this condition from carcinoma of the corpus uteri except by careful palpation of the interior of the organ and the removal of tissue for microscopical examination. In the benign condition this shows the ordinary changes characteristic of chronic endometritis, glandular hypertrophy, hyperplasia of the connective tissue, and round-cell infiltration.

The prognosis of fetid endometritis is favorable, though recurrence may occur after curettement. The cervix should always be thoroughly dilated with tents before operation, after which the uterus is to be tamponed with iodoform gauze saturated with a 30 per cent. solution of carbolic acid in glycerin.

PÆDIATRICS.

UNDER THE CHARGE OF

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ASSISTED BY

THOMPSON S. WESTCOTT, M.D.,
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Cerebro-spinal Meningitis due to the Meningococcus.—STOELZNER (*Berliner klinische Wochenschrift*, 1897, No. 16, S. 333) reports a case of epidemic cerebro-spinal meningitis in a girl, aged two and one-half years, terminating in recovery at the end of thirty-four days. The interest of the observation lies in the fact that lumbar puncture was made and that the cerebro-spinal fluid gave a pure culture of the intracellular meningococcus (Weichselbaum-Jaeger), which, according to the researches of Heubner, should be considered the specific cause of epidemic cerebro-spinal meningitis.

Purulent Arthritis in the Course of Epidemic Cerebro-spinal Meningitis.—FRONZ (*Wiener klinische Wochenschrift*, 1897, No. 15) reports the case of a boy, aged two and one-half years, admitted to the hospital with all the symptoms of a cerebro-spinal meningitis and an arthritis of the right ankle-joint, which had begun three days after the onset of the meningitis. Lumbar puncture gave issue to a turbid fluid, containing, besides numerous leucocytes, a great number of intracellular meningococci, which proved to be extremely virulent for mice, but less so for guinea-pigs.

Pus removed from the articulation also contained meningococci, which failed to grow. Cultures of the blood also remained sterile.

The child died about fifteen days after entrance. Two days before death he presented successively arthritis of the elbow and thumb of the left side and of the shoulder, elbow, and wrist of the right. The streptococcus alone was found in the exudate. At the autopsy the lesions of cerebro-spinal meningitis were found. The ankle-joint, which had contained meningococci in its exudate, was nearly well. The other articulations, which had been affected shortly before death and showed the presence of streptococci, were filled with pus.

According to the author, the arthritis of the ankle, which had existed from the early period of the disease, had been produced by the specific agent of the meningitis; while the other joint involvements were due to a secondary infection with the streptococcus. This observation shows that the meningococcus may penetrate the articulations and provoke the formation of an exudate; that this form of joint inflammation, like the meningitis due to the same cause, has a tendency to cure, which is absent in an arthritis due to streptococci or staphylococci.

The Use and Limitations of Condensed Milk in Infant Feeding.—KERLEY (*Medical News*, 1897, vol. lxx. No. 23) gives an admirable study of this sub-

ject. The analysis of a condensed-milk mixture, he finds, when diluted for use in the proportion of one part in six of water, gives 1 per cent. of fat, 1.2 per cent. of proteids, and 8 per cent. of sugar, a greater part of which is cane-sugar. It is extremely rare, however, to find a child who can take so rich a mixture without producing colic and indigestion. Most cases receive a 1 to 12 or 1 to 14 mixture. The 1 to 12 dilution gives a mixture containing 0.5 per cent. of fat, 0.6 per cent. proteids, and 4 per cent. sugar—a very inadequate combination. Apparent as the shortcomings are, many children will do comparatively well in early life on the weaker dilutions. There is sufficient carbohydrate to produce heat, and the proteids, though small in quantity, furnish the requisite amount of nitrogen. Many thrive on the 1 to 12 till the third month, then the demand for the system exceeds the supply of fat and proteids. If the diet is continued, rickets and malnutrition of varying degree will almost always follow.

Of the many hundred marasmic and rhachitic infants observed, the author believes that full 95 per cent. had been fed on the meal foods or on condensed milk, chiefly the latter. A few cases are met which have been fed exclusively on condensed milk up to the ninth or tenth month, and have thriven fairly well; they usually present some evidences of bone rickets.

Notwithstanding its many disadvantages, the author is compelled to give it to many children every year, chiefly among the poor, the ignorant, and the careless. It is now his effort to make up to such babies the deficiency of fats and proteids. Cream may be added in proportion to make up the deficient fat. Among dispensary patients cod-liver oil supplies the deficiency, the dose varying with the age of the baby, the ability to digest it, and the season of the year. Ten drops to a dessertspoonful, three or four times daily after feeding, are usually prescribed. During very hot weather the dose must be reduced or suspended if there are evidences of gastro-intestinal disturbance.

The low proportion of proteids may be increased by adding a meat-broth. One pound of lean beef is boiled in one quart of water till the liquid is reduced to one pint. Such a broth, according to analysis of J. S. Adriance, contains 0.8 per cent. proteids; so that if one part of condensed milk is added to twelve of broth the mixture will contain 0.5 per cent. fat, 1.4 per cent. proteids, and 4 per cent. sugar. This will answer for a child three months old, fat being supplied by cod-liver oil. When the sixth month is reached one part of condensed milk may be added to nine of broth. The percentages then will be, approximately, 0.75 per cent. of fat, 1.7 per cent. proteids, and 5 per cent. sugar. This, with cod-liver oil, will answer until the eighth or ninth month, when the critical nursing period will have been passed, and barley and oatmeal gruel, with other meal mixtures, may be allowed.

The Absorption of Milk-fats in Children.—KNOEPFELMACHER (*Wiener klinische Wochenschrift*, 1897, No. 30, S. 695) studied the conditions of absorption of food-fats in the intestinal canal with especial reference to the milk-fats in the diet of young children. His conclusions are: 1. That the fat in the feces of adults and children upon an exclusive milk-diet contains 12 to 20 per cent. olein, the greater part of which belongs to the fat discharged

with the digestive juices, a smaller proportion to unabsorbed milk-fat. 2. That the fat in the stools of nurslings contains 28.8 to 37.8 per cent. of olein. Only a very slight proportion of this, about 5 per cent., corresponds to the partly digested fat, the rest of the olein of the feces-fat coming from the unabsorbed milk-fat. 3. That in the nursling the appropriation of milk-fat is somewhat less active than in older children and adults.

Researches Upon the Pathogenesis of Rhachitis.—SMANIOTTO ETTORE (*Revue Mensuelle des Maladies de l'Enfance*, March and April, 1897) has made careful study of the epiphyses of rhachitic and non-rhachitic bones of young children. Out of 25 observations of non-rhachitic bones of children dead of various infectious diseases, the cultures remained sterile in 16; six times pure cultures of streptococci were found, twice the bacterium coli commune, and once some rare colonies of the staphylococcus pyogenes albus. From these results the author concluded that in a septicæmia in the child microbes readily invaded the bones, and in the long bones it is especially the epiphyses that are affected; that in the child the bacterium coli commune and other bacteria of the intestine do not invade the bones within the first thirty to thirty-five hours after death, or, at least, this is extremely rare.

In the second place, 22 observations upon distinctly rhachitic bones were made. A *résumé* of these observations presents the following conclusions: With children who have suffered from a grave chronic gastro-enteritis there can be found in the epiphyses of rhachitic bones a great number of bacteria; these are especially the bacteia of the intestine, the colon bacillus with its varieties being the most constant. Next comes a peculiar bacillus found by the author in rhachitic alterations of grave degree; then the streptococcus, the bacillus pyocyaneus, the staphylococcus, and several other cocci. There is always an association of bacteria. In rhachitis of moderate gravity always due to a chronic gastro-enteritis, the number of bacteria which have invaded the epiphyses is small and the varieties not numerous.

In children dead of chronic lesions of the organs of respiration, and exhibiting symptoms of mild rhachitis, the streptococcus was found four times, and in one case of purulent pleurisy due to the pneumococcus, this bacterium was found.

In all cases in which the rhachitic lesions were grave, and where the diaphysis of the ribs was also affected, this portion of the bone always showed discrete colonies of the same bacteria as were found in greater profusion in the epiphysis. In cases of slight rhachitis, however, where the lesions were appreciable at the epiphyses, but very little or not at all distinguishable in the diaphyses, cultures from the latter portion of the bones showed only rare colonies or remained sterile.

The author believes it is scarcely possible to interpret these facts by assuming an invasion of the bones during the death agony or after death by intestinal bacteria. He believes his deductions are correct from the results of his examinations of non-rhachitic bones, from the presence in rhachitic bones of these bacteria just where the characteristic lesions of rhachitis are found, and especially from a personal observation in one of his cases, where a rhachitic bone was punctured during life and blood withdrawn from it

showed the presence of the bacillus pyocyaneus, streptococci, and a peculiar coccus. These facts are strongly opposed to the view of a possible agonal invasion.

The observations in this interesting study, while not sufficiently numerous to permit of positive conclusions that rhachitis is always of infectious origin, seem strongly to indicate that bacteria play a preponderant *rôle* in the pathogenesis of this affection. It appears to be due, most frequently, to a localization in the bones of all the infections or auto-infections by which children badly nourished and badly cared for are frequently attacked in the early months of life, especially if they are congenitally weak.

Bacteriuria as a Cause of Diurnal Enuresis.—Lyder Nicolaysen (*Deutsche medicinische Wochenschrift*, March 25, 1897, S. 195) calls attention to what seems to be a frequent cause of diurnal incontinence of urine in children. Out of 5000 patients with incontinence only eight were found who presented the phenomena of incontinence by day but without disturbance during sleep. In four of these cases, more carefully examined than the preceding four, pure cultures of the colon bacillus were found. In only one of these was there slight pain in micturating. The condition is readily detected by stained cover-glass preparations of the freshly passed urine and by culture-tests. This condition has been especially described by Krogius (*Annales des Maladies des Organes génito-urinaires*, xii. p. 196), who reported eight cases, one of which came to section and showed evidences of beginning interstitial nephritis, but macroscopically (?), no evidences of disease of bladder or pelvis of the kidney. The author is disposed to attach considerable etiological importance to the fact that bacteriuria existed in four of his eight cases of diurnal incontinence, though Roosing (*Krankheiten der Nieren und Ureteren*, Copenhagen, 1895) has suggested that a small renal concretion may be present in the pelvis of the kidney in these cases. In two cases of undoubted nephrolithiasis recorded by this writer bacteriuria also existed. No evidences of renal disease were to be found in any of Nicolaysen's cases.

In the author's hands treatment has been rather unsatisfactory. Only two of the cases could be properly followed up, and while improvement in the incontinence followed repeated lavage with solutions of silver nitrate, the urine continued to show the presence of a certain number of bacteria.

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